*GE Healthcare*

# Technical Publications

## Direction 5434104-100

Rev.2

CE 0459

LOGIQ S7 Expert/Pro Basic User Manual

Operating Documentation

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# *Regulatory Requirement*

**LOGIQ S7 Expert/Pro complies with regulatory requirements of the following European Directive 93/42/EEC concerning medical devices.**

CE 0459

**This manual is a reference for the LOGIQ S7 Expert/Pro. It applies to all versions of the R1.x.x software for the LOGIQ S7 Expert/Pro ultrasound system.**

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# Revision History

Reason for Change

| REV | DATE (YYYY/MM/DD) | REASON FOR CHANGE |
|---|---|---|
| Rev. 1 | 2012/01/18 | Initial release |
| Rev. 2 | 2012/06/20 | Had some feedback for enhancement |

List of Effective Pages

| PAGE NUMBER | REVISION NUMBER | PAGE NUMBER | REVISION NUMBER |
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| Title Page | Rev.2 | Chapter 9 | Rev.2 |
| Revision History | Rev.2 | Chapter 10 | Rev.2 |
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| Chapter 5 | Rev.2 | Chapter 17 | Rev.2 |
| Chapter 6 | Rev.2 | Chapter 18 | Rev.2 |
| Chapter 7 | Rev.2 | Index | Rev.2 |
| Chapter 8 | Rev.2 | | |

Please verify that you are using the latest revision of this document. Information pertaining to this document is maintained on ePDM (GE Healthcare electronic Product Data Management). If you need to know the latest revision, contact your distributor, local GE Sales Representative or in the USA call the GE Ultrasound Clinical Answer Center at 1 800 682 5327 or 1 262 524 5698.

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# Regulatory Requirements

## Conformance Standards

The following classifications are in accordance with the IEC/EN 60601-1:6.8.1:

- According to 93/42/EEC Medical Device Directive, this is Class IIa Medical Device.
- According to IEC/EN 60601-1,
  - Equipment is Class I, Type BF or CF Applied Parts.
- According to CISPR 11,
  - Equipment is Group 1, Class B ISM Equipment.
- According to IEC 60529,
  - The footswitch rate IPx8 is suitable for use in surgical rooms.
  - Probe head (immersible portion) and cable are IPX7

    Probe connector is not waterproof.

This product complies with the regulatory requirement of the following:

- Council Directive 93/42/EEC concerning medical devices: the CE label affixed to the product testifies compliance to the Directive.

  The location of the CE marking is shown in the Safety chapter of this manual.

  European registered place of business:

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EC REP

## Conformance Standards (continued)

- International Electrotechnical Commission (IEC).
  - IEC/EN 60601-1 Medical Electrical Eqiupment, Part 1 General Requirements for Safety.
  - IEC/EN 60601-1-1 Safety requirements for medical electrical systems.
  - IEC/EN 60601-1-2 Electromagnetic compatibility - Requirements and tests.
  - IEC/EN 60601-1-4 Programmable electrical medical systems.
  - IEC 60601-1-6 (Usability), EN 1041 (Information supplied with medical devices)
  - IEC 60601-2-37 Medical electrical equipment. Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment.
  - IEC 61157 Declaration of acoustic output parameters.
- International Organization of Standards (ISO)
  - ISO 10993-1 Biological evaluation of medical devices.
- Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.
  - UL 60601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- Canadian Standards Association (CSA).
  - CSA 22.2, 601.1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- NEMA/AIUM Acoustic Output Display Standard (NEMA UD-3).
- Medical Device Good Manufacturing Practice Manual issued by the FDA (Food and Drug Administration, Department of Health, USA).

## Certifications

- General Electric Medical Systems is ISO 9001 and ISO 13485 certified.

## Original Documentation

- The original document was written in English.

## Country Specific Approval

The following optional features ARE NOT available in the USA and its territories:

- Elastography Quantification
- Contrast Enhanced Ultrasound

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# *Chapter 1*

# Introduction

*This chapter consists of information concerning indications for use/contraindications, contact information and how this documentation is organized.*

# System Overview

## Attention

This manual contains necessary and sufficient information to operate the system safely. Advanced equipment training may be provided by a factory trained Applications Specialist for the agreed-upon time period.

Read and understand all instructions in this manual before attempting to use the LOGIQ S7 Expert/Pro system.

Keep this manual with the equipment at all times. Periodically review the procedures for operation and safety precautions.

Disregarding information on safety is considered abnormal use.

Not all features or products described in this document may be available or cleared for sale in all markets. Please contact your local GE Healthcare Ultrasound representative to get the latest information.

*NOTE: Please note that orders are based on the individually agreed upon specifications and may not contain all features listed in this manual.*

*NOTE: All references to standards / regulations and their revisions are valid at the time of publication of the user manual.*

## Documentation

Safety instructions must be reviewed before operating the unit.

LOGIQ S7 Expert/Pro documentation consists of various manuals:

- The Basic User Manual, User Guide, and Online Help (TRANSLATED) provides information needed by the user to operate the system safely. It describes the basic functions of the system, safety features, operating modes, measurements/calculations, probes, and user care and maintenance.
- The Advanced Reference Manual (ENGLISH ONLY) contains data tables, such as OB and Acoustic Output tables.
- AIUM Booklet (USA Only)
- The Service Manual (ENGLISH ONLY) supplies block diagrams, lists of spare parts, descriptions, adjustment instructions or similar information which helps qualified technical personnel in repairing those parts of the system which have been defined as repairable.

The LOGIQ S7 Expert/Pro manuals are written for users who are familiar with basic ultrasound principles and techniques. They do not include sonographic training or detailed clinical procedures.

*NOTE: The Service manual is only provided in electronic format on the eDoc CD.*

*NOTE: The eDoc CD includes English and all translations.*

*NOTE: Dates on screenshots are represented in MM/DD/YYYY format throughout the manual. Information on how to change the system's date can be found in Customizing Your System.*

*NOTE: The screen graphics in this manual are only for illustrational purposes. Actual screen output may differ.*

## Principles of Operation

Medical ultrasound images are created by computer and digital memory from the transmission and reception of mechanical high-frequency waves applied through a transducer. The mechanical ultrasound waves spread through the body, producing an echo where density changes occur. For example, in the case of human tissue, an echo is created where a signal passes from an adipose tissue (fat) region to a muscular tissue region. The echoes return to the transducer where they are converted back into electrical signals.

These echo signals are highly amplified and processed by several analog and digital circuits having filters with many frequency and time response options, transforming the high-frequency electrical signals into a series of digital image signals which are stored in memory. Once in memory, the image can be displayed in real-time on the image monitor. All signal transmission, reception and processing characteristics are controlled by the main computer. By selection from the system control panel, the user can alter the characteristics and features of the system, allowing a wide range of uses, from obstetrics to peripheral vascular examinations.

Transducers are accurate, solid-state devices, providing multiple image formats. The digital design and use of solid-state components provides highly stable and consistent imaging performance with minimal required maintenance. Sophisticated design with computer control offers a system with extensive features and functions which is user-friendly and easy to use.

## Indications for Use

The LOGIQ S7 Expert/Pro is intended for use by a qualified physician for ultrasound evaluation.

**Frequency of Use**

Daily (Typically 8 hours)

**Operator Profile**

- Qualified and trained physicians or sonographers with at least basic ultrasound knowledge.
- The operator must have read and understood the user manual.

**Clinical Applications**

Specific clinical applications and exam types include:

- Abdominal
- Obstetrical
- Gynecological
- Breast
- Small Parts
- Vascular/Intraoperative/Peripheral
- Transcranial
- Pediatric
- Neonatal
- Musculoskeletal
- Urological
- Cardiac
- Interventional

Image Acquisition is for diagnostic purposes, including measurements on acquired images.

This machine should be used in compliance with law. Some jurisdictions restrict certain uses, such as gender determination.

## Contraindication

The LOGIQ S7 Expert/Pro ultrasound system is not intended for ophthalmic use or any use causing the acoustic beam to pass through the eye.

## Prescription Device

Rx Only

CAUTION: United States law restricts this device to sale or use by, or on the order of a physician.

# Contact Information

## Contacting GE Healthcare Ultrasound

For additional information or assistance, please contact your local distributor or the appropriate support resource listed on the following pages:

**INTERNET**

http://www.gehealthcare.com

http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html

**Clinical Questions**

For information in the United States, Canada, Mexico and parts of the Caribbean, call the Customer Answer Center
TEL: (1) 800-682-5327 or (1) 262-524-5698

In other locations, contact your local Applications, Sales or Service Representative.

**Service Questions**

For service in the United States, call GE CARES

TEL: (1) 800-437-1171

In other locations, contact your local Service Representative.

**Information Requests**

To request technical product information in the United States, call GE Healthcare

TEL: (1) 800-643-6439

In other locations, contact your local Applications, Sales or Service Representative.

**Placing an Order**

To order accessories, supplies or service parts in the United States, call the GE Healthcare Technologies Contact Center

TEL: (1) 800-558-5102

In other locations, contact your local Applications, Sales or Service Representative.

## Contacting GE Healthcare Ultrasound (continued)

### AMERICAS

**ARGENTINA**
GEME S.A. TEL: (1) 639-1619
Miranda 5237 FAX: (1) 567-2678
Buenos Aires - 1407

**BRAZIL**
GE Healthcare Clinical Systems
Equipamentos Médicos Ltda TEL: 3067-8493
Av. Das Nações Unidas, 8501 FAX: (011) 3067-8280
3º andar parte - Pinheiros
São Paulo SP – CEP: 05425-070
C.N.P.J.: 02.022.569/0001-83

**CANADA**
GE Healthcare TEL: (1) 800-668-0732
Ultrasound Service Engineering
9900 Innovation Drive
Wauwatosa, WI 53226
Customer Answer Center TEL: (1) 262-524-5698

**LATIN & SOUTH AMERICA**
GE Healthcare TEL: (1) 262-524-5300
Ultrasound Service Engineering
9900 Innovation Drive
Wauwatosa, WI 53226
Customer Answer Center TEL: (1) 262-524-5698

**MEXICO**
GE Sistemas Medicos de Mexico S.A. de C.V.
Rio Lerma #302, 1° y 2° Pisos TEL: (5) 228-9600
Colonia Cuauhtemoc FAX: (5) 211-4631
06500-Mexico, D.F.

**USA**
GE Healthcare TEL: (1) 800-437-1171
Ultrasound Service Engineering FAX: (1) 414-721-3865
9900 Innovation Drive
Wauwatosa, WI 53226

## Contacting GE Healthcare Ultrasound (continued)

### ASIA

**ASIA PACIFIC JAPAN**
GE Healthcare Asia Pacific
4-7-127, Asahigaoka
Hinoshi, Tokyo
191-8503, Japan
TEL: +81 42 585 5111

**AUSTRALIA NEW ZEALAND**
Building 4B, 21 South St
Rydalmere NSW 2116
Australia
TEL: 1300 722 229

8 Tangihua Street
Auchland 1010
New Zealand
TEL: 0800 434 325

**CHINA**
GE Healthcare - Asia TEL: (8610) 5806 8888
No. 1, Yongchang North Road FAX: (8610) 6787 1162
Beijing Economic & Technology Development Area
Beijing 100176, China

**KOREA**
Seoul, Korea
TEL: +82 2 6201 3114

**SINGAPORE**
1 Maritime Square #13-012
HarbourFront Center
Singapore 099253
TEL: +65 6291 8528

**TURKEY**
GE Healthcare Turkiye TEL: +90 212 366 29 00
Sun Plaza FAX: +90 212 366 29 99
Dereboyu Sok. No 24/7
34398 Maslak
ISTANBUL

## Contacting GE Healthcare Ultrasound (continued)

### EUROPE

For all other European countries not listed, please contact your local GE Healthcare distributor or the appropriate support resource listed on www.gehealthcare.com.

**AUSTRIA**
General Electric Austria GmbH TEL: (+43) 1 97272 0
Filiale GE Healthcare Technologies FAX: (+43) 1 97272 2222
EURO PLAZA, Gebaude EWienerbergstrasse 41A-1120 Vienna

**BELGIUM**
GE Medical Systems Ultrasound TEL: (+32) 2 719 7204
Eagle Building FAX: (+32) 2 719 7205
Kouterveldstraat 20
1831 DIEGEM

**CZECH REPUBLIC**
GE Medical Systems Ultrasound
Vyskocilova 1422/1a
140 28 Praha

**DENMARK**
GE Medical Systems Ultrasound TEL: (+45) 43 295 400
Park Alle 295, 2605 Brøndby FAX: (+45) 43 295 399

**ESTONIA & FINLAND**
GE Medical Systems TEL: (+358) 10 39 48 220
Kuortaneenkatu 2, 000510 Helsinki FAX: (+358) 10 39 48 221P.O.Box 330, 00031 GE Finland

**FRANCE**
GE Medical Systems Ultrasound
and Primary Care Diagnostics
F-78457 Velizy FAX: (+33) 13 44 95 202
General Imaging TEL: (+33) 13 449 52 43
Cardiology TEL: (+33) 13 449 52 31

**GERMANY**
GE Healthcare GmbH TEL: (+49) 212-28 02-0
Beethovenstr. 239 FAX: (+49) 212-28 02 28
42655 Solingen

**GREECE**
GE Healthcare TEL: (+30) 210 8930600
8-10 Sorou Str. Marousi FAX: (+30) 210 9625931
Athens 15125 Hellas

## EUROPE (continued)

| | |
|---|---|
| **HUNGARY** | GE Hungary Zrt. Ultrasound TEL: (+36) 23 410 314<br>Division, Akron u. 2. FAX: (+36) 23 410 390<br>Budaors 2040 Hungary |
| **NORTHERN IRELAND** | GE Healthcare TEL: (+44) 28 90229900<br>Victoria Business Park,9, Westbank Road, Belfast BT3 9JL. |
| **REPUBLIC OF IRELAND** | GE Healthcare TEL: (+353) 1 4605500<br>Unit F4, Centrepoint Business Park<br>Oak Drive, Dublin 22 |
| **ITALY** | GE Medical Systems Italia spa TEL: (+39) 02 2600 1111<br>Via Galeno, 36, 20126 Milano FAX: (+39) 02 2600 1599 |
| **NETHERLANDS** | GE Healthcare TEL: (+31) 33 254 1290<br>De Wel 18 B, 3871 MV Hoevelaken FAX: (+31) 33 254 1292<br>PO Box 22, 3870 CA Hoevelaken |
| **NORWAY** | GE Medical Systems Ultrasound TEL: (+47) 2202 0800<br>Tåsenveien 71, 0873 Oslo |
| | GE Medical Systems Ultrasound TEL: (+47) 33 02 11 16<br>Strandpromenaden 45 P.O. Box 141, 3191 Horten |
| **POLAND** | GE Medical Systems Polska TEL: (+48) 22 330 83 00<br>Sp. z o.o., ul. Woloska 9 FAX: (+48) 22 330 83 83<br>02-583 Warszawa, Poland |
| **PORTUGAL** | General Electric Portuguesa TEL: (+351) 21 425 1309<br>SA. Avenida do Forte, n° 4 FAX: (+351) 21 425 1343<br>Fraccao F, 2795-502 Carnaxide |

## EUROPE (continued)

| | |
|---|---|
| **RUSSIA** | GE Healthcare TEL: (+7) 4957 396931<br>Krasnopresnenskaya nab. FAX: (+7) 4957 396932<br>18, bld A, 10th floor<br>123317 Moscow, Russia |
| **SPAIN** | GE Healthcare Espana TEL: (+34) 91 663 2500<br>C/ Gobelas 35-37 FAX: (+34) 91 663 2501<br>28023 Madrid |
| **SWEDEN** | GE Medical Systems Ultrasound TEL: (+46) 8 559 50010<br>PO Box 314, 17175 Stockholm |
| **SWITZERLAND** | GE Medical Systems Ab TEL: (+41) 1 809 92 92<br>Europastrasse 31, FAX: (+41) 1 809 92 22<br>8152 Glattbrugg |
| **UNITED ARAB EMIRATES (UAE)** | GE Healthcare TEL: (+971) 4 429 6101 or 4 429 6161<br>Dubai Internet City, Building No. 18 Fax (+971) 4 429 6201<br>P. O. Box # 11549, Dubai<br>U.A.E |
| **UNITED KINGDOM** | GE Medical Systems Ultrasound TEL: (+44) 1707 263570<br>71 Great North Road FAX: (+44) 1707 260065<br>Hatfield, Hertfordshire, AL9 5EN |

## Manufacturer

GE Ultrasound Korea, Ltd.
65-1, Sangdaewon-dong, Jungwon-gu, Seongnam-si,
Gyeonggi-do, 462-120
KOREA

# Chapter 2

# Safety

*Describes the safety and regulatory information pertinent for operating this ultrasound system.*

# Owner Responsibility

It is the responsibility of the owner to ensure that anyone operating the system reads and understands this section of the manual. However, there is no representation that the act of reading this manual renders the reader qualified to operate, inspect, test, align, calibrate, troubleshoot, repair or modify the system. The owner should make certain that only properly trained, fully-qualified service personnel undertake the installation, maintenance, troubleshooting, calibration and repair of the equipment.

The owner of the ultrasound unit should ensure that only properly trained, fully qualified personnel are authorized to operate the system. Before authorizing anyone to operate the system, it should be verified that the person has read, and fully understands, the operating instructions contained in this manual. It is advisable to maintain a list of authorized operators.

Should the system fail to operate correctly, or if the unit does not respond to the commands described in this manual, the operator should contact the nearest field GE Ultrasound Service Office.

For information about specific requirements and regulations applicable to the use of electronic medical equipment, consult the local, state and federal agencies.

CAUTION

For USA only:

Federal law restricts this device to use by, or on the orders of, a physician.

## Notice against user modification

Never modify this product, including system components, software, cables, and so on. User modification may cause safety hazards and degradation in system performance. All modification must be done by a GE qualified person.

# Safety Precautions

## Precaution Levels

Various levels of safety precautions may be found on the equipment and different levels of concern are identified by one of the following flag words and icons which precede the precautionary statement.

Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause:

- Severe personal injury
- Substantial property damage.

Indicates that a potential hazard may exist which through inappropriate conditions or actions will or can cause:

- Minor injury
- Property damage.

*NOTE:* *Indicates precautions or recommendations that should be used in the operation of the ultrasound system, specifically:*

- *Maintaining an optimum system environment*
- *Using this Manual*
- *Notes to emphasize or clarify a point.*

## Hazard Symbols

### Icon Description

Potential hazards are indicated by the following icons:

Table 2-1: Potential Hazards

| Icon | Potential Hazard | Usage | Source |
|---|---|---|---|
| | **Biological Hazard**<br>Describes precautions necessary to prevent the risk of disease transmission or infections.<br>• Patient/user infection due to contaminated equipment. | • Cleaning and care instructions<br>• Sheath and glove guidelines | ISO 7000 No. 0659 |
| | **Electrical Hazard**<br>Describes precautions necessary to prevent the risk of injury through electric hazards.<br>• Electrical micro-shock to patient, e.g., ventricular | • Probes<br>• ECG, if applicable<br>• Connections to back panel | |
| | **Moving Hazard**<br>Describes precautions necessary to prevent the risk of injury through moving or tipping hazard!<br>• Console, accessories or optional storage devices that can fall on patient, user, or others.<br>• Collision with persons or objects may result in injury while maneuvering or during system transport.<br>• Injury to user from moving the console. | • Moving<br>• Using brakes<br>• Transporting | |
| | **Acoustic Output Hazard**<br>• Patient injury or tissue damage from ultrasound radiation. | • ALARA, the use of Power Output following the ‘as low as reasonably achievable’ principle | |
| | **Explosion Hazard**<br>Describes precautions necessary to prevent the risk of injury through explosion hazard!<br>• Risk of explosion if used in the presence of flammable anesthetics. | • Flammable anesthetic | |
| | **Fire and Smoke Hazard**<br>• Patient/user injury or adverse reaction from fire or smoke.<br>• Patient/user injury from explosion and fire. | • Replacing fuses<br>• Outlet guidelines | |

## Important Safety Considerations

The following topic headings (Patient Safety, and Equipment and Personnel Safety) are intended to make the equipment user aware of particular hazards associated with the use of this equipment and the extent to which injury can occur if precautions are not observed. Additional precautions may be provided throughout the manual.

CAUTION

Improper use can result in serious injury. The use of the system outside the descibed conditions or intended use, and disregarding safety related information is considered abnormal use. The user must be thoroughly familiar with the instructions and potential hazards involving ultrasound examination before attempting to use the device. Training assistance is available from GE Healthcare if needed.

Disregarding information on safety is considered abnormal use.

CAUTION

The use of the system outside the described conditions or intended use, and disregarding safety related information is considered as abnormal use. The manufacturer is not liable for damage caused by abnormal use of the device.

## Patient Safety

The concerns listed can seriously affect the safety of patients undergoing a diagnostic ultrasound examination.

### Patient identification

Always include proper identification with all patient data and verify the accuracy of the patient's name and ID numbers when entering such data. Make sure correct patient ID is provided on all recorded data and hard copy prints. Identification errors could result in an incorrect diagnosis.

The ultrasound system is not meant to be long term storage for patient data or images. The customers are responsible for the data on the system and a regular backup is highly recommended.

In the case where the system needs to be brought back in for repair, please ensure that any patient information is backed up and erased from the system before shipping. It is always possible during system failure and repair to lose patient data and GE will not be held responsible for the loss of this data.

## Diagnostic information

The images and calculations provided by the system are intended for use by competent users, as a diagnostic tool. They are explicitly not to be regarded as the sole, irrefutable basis for clinical diagnosis. Users are encouraged to study the literature and reach their own professional conclusions regarding the clinical utility of the system.

The user should be aware of the product specifications and of the system accuracy and stability limitations. These limitations must be considered before making any decision based on quantitative values. If in doubt, the nearest GE Ultrasound Service Office should be consulted.

Equipment malfunction or incorrect settings can result in measurement errors or failure to detect details within the image. The equipment user must become thoroughly familiar with the equipment operation in order to optimize its performance and recognize possible malfunctions. Applications training is available through the local GE representative. Added confidence in the equipment operation can be gained by establishing a quality assurance program.

CAUTION

Be certain to ensure privacy data of patient information.

## Mechanical hazards

The use of damaged probes can result in injury or increased risk of infection. Inspect probes often for sharp, pointed, or rough surface damage that could cause injury or tear protective barriers.

Never use excessive force when manipulating intracavity probes. Become familiar with all instructions and precautions provided with special purpose probes.

Electrical Hazard

A damaged probe can also increase the risk of electric shock if conductive solutions come in contact with internal live parts. Inspect probes often for cracks or openings in the housing and holes in and around the acoustic lens or other damage that could allow liquid entry. Become familiar with the probe's use and care precautions outlined in *Probes and Biopsy*.

## ALARA

CAUTION

Ultrasound can produce harmful effects in tissue and potentially result in patient injury. Always minimize exposure time and keep ultrasound levels low when there is no medical benefit. Use the principle of ALARA (As Low As Reasonably Achievable), increasing output only when needed to obtain diagnostic image quality. Observe the acoustic output display and be familiar with all controls affecting the output level. See the *Bioeffects section* of the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information.

## Training

It is recommended that all users receive proper training in applications before performing them in a clinical setting. Please contact the local GE representative for training assistance.

ALARA training is provided in the Medical Ultrasound Safety booklet shipped in the eDOCs kit. The ALARA education program for the clinical end-user covers basic ultrasound principles, possible biological effects, the derivation and meaning of the indices, ALARA principles, and examples of specific applications of the ALARA principle.

## Equipment and Personnel Safety

The concerns listed below can seriously affect the safety of equipment and personnel during a diagnostic ultrasound examination.

Do not use this equipment if a safety problem is known to exist. Have the unit repaired and performance verified by qualified service personnel before returning to use.

### Related Hazards

WARNING

This equipment contains dangerous voltages that are capable of serious injury or death.

If any defects are observed or malfunctions occur, stop operating the equipment and perform the proper action for the patient. Inform a qualified service person and contact a Service Representative for information.

There are no user serviceable components inside the console. Refer all servicing to qualified service personnel only.

Ensure that unauthorized personnel do not tamper with the unit.

Electrical Hazard

To avoid injury:

- Do not remove protective covers. No user serviceable parts are inside. Refer servicing to qualified service personnel.
- To assure adequate grounding, connect the attachment plug to a reliable (hospital grade) grounding outlet (having equalization conductor ⏚ ).
- Never use any adaptor or converter of a three-prong-to-two-prong type to connect with a mains power plug. The protective earth connection will loosen.
- Do not place liquids on or above the console. Spilled liquid may contact live parts and increase the risk of shock.
- Plug any peripherals into the AC power outlet.

Smoke & Fire Hazard

The system must be supplied from an adequately rated electrical circuit. The capacity of the supply circuit must be as specified.

Explosion Hazard

Never operate the equipment in the presence of flammable or explosive liquids, vapors or gases. Malfunctions in the unit, or sparks generated by fan motors, can electrically ignite these substances. Operators should be aware of the following points to prevent such explosion hazards.

- If flammable substances are detected in the environment, do not plug in or turn on the system.
- If flammable substances are detected after the system has been turned on, do not attempt to turn off the unit, or to unplug it.
- If flammable substances are detected, evacuate and ventilate the area before turning off the unit.

CAUTION

This equipment provides no special means of protection from high frequency (HF) burns that may result from using an electrosurgical unit (ESU). To reduce the risk of HF burns, avoid contact between the patient and ultrasound transducer while operating the ESU. Where contact cannot be avoided, as in the case of TEE monitoring during surgery, make sure the transducer is not located between the ESU active and dispersive electrodes and keep the ESU cables away from the transducer cable.

CAUTION

To avoid skin burns in surgical use, do not place ECG electrodes in the current path between the Electrosurgical Unit (ESU) active and dispersive electrodes. Keep ESU cables away from ECG leads.

CAUTION

DO NOT touch the patient and any of the connectors on the ultrasound unit simultaneously, including ultrasound probe connectors.

DO NOT touch the conducting parts of the USB, Ethernet, Video, Audio cables when connecting equipment to the unit.

CAUTION

DO NOT load non-system software on the system computer.

Biological Hazard

For patient and personnel safety, be aware of biological hazards while performing invasive procedures. To avoid the risk of disease transmission:

- Use protective barriers (gloves and probe sheaths) whenever possible. Follow sterile procedures when appropriate.
- Thoroughly clean probes and reusable accessories after each patient examination and disinfect or sterilize as needed. Refer to *Probes and Biopsy* for probe use and care instructions.
- Follow all infection control policies established by your office, department or institution as they apply to personnel and equipment.

CAUTION

**Pacemaker hazard**

The possibility of the system interfering with pacemakers is minimal. However, as this system generates high frequency electrical signals, the operator should be aware of the potential hazard this could cause.

## Moving Hazard

CAUTION

Take extra care when moving the system.

The equipment weighs approximately 90 kg (198 lbs) To avoid possible injury and equipment damage when transporting from one area of use to another:

- Be sure the pathway is clear.
- Limit movement to a slow careful walk.
- Use two or more persons to move the equipment on inclines or long distance.

## Allergic reactions to latex-containing medical devices

Due to reports of severe allergic reactions to medical devices containing latex (natural rubber), the FDA advises health-care professionals to identify latex-sensitive patients, and be prepared to treat allergic reactions promptly. Latex is a component of many medical devices, including surgical and examination gloves, catheters, incubation tubes, anesthesia masks and dental dams. Patient reaction to latex has ranged from contact urticaria, to systemic anaphylaxis.

For more details regarding allergic reaction to latex, refer to FDA Medical Alert MDA91-1, March 29.

## Classifications

Type of protection against electric shock

Class I Equipment (*1)

Degree of protection against electric shock

Type BF Applied part (*2) (for Probes marked with BF symbol)

Type CF Applied part (*3) (for ECG marked with CF symbol)

Continuous Operation

System is Ordinary Equipment (IPX0)

Footswitch is IPX8

Probe head (immersible portion) and cable are IPX7

*NOTE: Probe connector is not waterproof.*

***1. Class I Equipment***

EQUIPMENT in which protection against electric shock does not rely on BASIC INSULATION only, but includes an earth ground. This additional safety precaution prevents exposed metal parts from becoming LIVE in the event of an insulation failure.

***2. Type BF Applied Part***

TYPE BF APPLIED PART providing a specified degree of protection against electric shock, with particular regard to allowable LEAKAGE CURRENT.

***3. Type CF Applied Part***

TYPE CF APPLIED PART providing a degree of protection higher than that for Type BF Applied Part against electric shock particularly regarding allowable LEAKAGE CURRENTS.

Table 2-2: Type BF Equipment

| | Normal Mode | Single fault condition |
|---|---|---|
| Patient leakage current | Less than 100 microA | Less than 500 microA |

Table 2-3: Type CF Equipment

| | Normal Mode | Single fault condition |
|---|---|---|
| Patient leakage current | Less than 10 microA | Less than 50 microA |

## EMC (Electromagnetic Compatibility)

*NOTE: This equipment generates, uses and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and radio communications. To provide reasonable protection against such interference, this product complies with emissions limits for a Group 1, Class B Medical Devices Directive as stated in EN 60601-1-2. However, there is no guarantee that interference will not occur in a particular installation.*

*NOTE: If this equipment is found to cause interference (which may be determined by turning the equipment on and off), the user (or qualified service personnel) should attempt to correct the problem by one or more of the following measure(s):*

- *reorient or relocate the affected device(s)*
- *increase the separation between the equipment and the affected device*
- *power the equipment from a source different from that of the affected device*
- *consult the point of purchase or service representative for further suggestions.*

*NOTE: The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.*

*NOTE: To comply with the regulations on electromagnetic interference for a Class B FCC Device, all interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference in violation of the FCC regulations.*

## EMC (Electromagnetic Compatibility) (continued)

*NOTE: Do not use devices which intentionally transmit RF Signals (cellular phones, transceivers, or radio controlled products) other than those supplied by GE (wireless microphone, broadband over power lines, for example) in the vicinity of the equipment as it may cause performance outside the published specifications. Keep the power to these type devices turned off when near this equipment.*

*The medical staff in charge of this equipment is required to instruct technicians, patients, and other people who maybe around this equipment to fully comply with the above requirement.*

### EMC Performance

All types of electronic equipment may characteristically cause electromagnetic interference with other equipment, either transmitted through air or connecting cables. The term EMC (Electromagnetic Compatibility) indicates the capability of equipment to curb electromagnetic influence from other equipment and at the same time not affect other equipment with similar electromagnetic radiation from itself.

Proper installation following the service manual is required in order to achieve the full EMC performance of the product.

The product must be installed as stipulated in 4.2, Notice upon Installation of Product.

In case of issues related to EMC, please call your service personnel.

The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

## EMC Performance (continued)

CAUTION

Do not use devices which intentionally transmit RF signals (cellular phones, transceivers, or radio controlled products), other than those supplied by GE (wireless microphone, broadband over power lines, for example) unless intended for use with this system, in the vicinity of this equipment as it may cause performance outside the published specifications.

Keep power to these devices turned off when near this equipment.

Medical staff in charge of this equipment is required to instruct technicians, patients and other people who may be around this equipment to fully comply with the above regulation.

Portable and mobile radio communications equipment (e.g. two-way radio, cellular/cordless telephones, wireless computer networks) should be used no closer to any part of this system, including cables, than determined according to the following method:

Table 2-4: Portable and mobile radio communications equipment distance requirements

| **Frequency Range:** | **150 kHz - 80 MHz** | **80 MHz - 800 MHz** | **800 MHz - 2.5 GHz** |
|---|---|---|---|
| Calculation Method: | d=[3.5/$V_1$] square root of P | d = [3.5/$E_1$] square root of P | d = [7/$E_1$] square root of P |
| Where: d= separation distance in meters, P = rated power of the transmitter, $V_1$=compliance value for conducted RF, $E_1$ = compliance value for radiated RF | | | |
| **If the maximum transmitter power in watts is rated** | **The separation distance in meters should be** | | |
| 5 | 2.6 | 2.6 | 5.2 |
| 20 | 5.2 | 5.2 | 10.5 |
| 100 | 12.0 | 12.0 | 24.0 |

## Notice upon Installation of Product

Separation distance and effect from fixed radio communications equipment: field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast transmitter cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ultrasound system is used exceeds the applicable RF compliance level as stated in the immunity declaration, the ultrasound system should be observed to verify normal operation. If abnormal operation is observed, additional measures may be necessary, such as re-orienting or relocating the ultrasound system or using an RF shielded examination room may be necessary.

1. Use either power supply cords provided by GE Healthcare or ones designated by GE Healthcare. Products equipped with a power source plug should be plugged into the fixed power socket which has the protective grounding conductor. Never use any adaptor or converter to connect with a power source plug (e.g. three-prong-to-two-prong converter).
2. Locate the equipment as far away as possible from other electronic equipment.
3. Be sure to use only the cables provided by or designated by GE Healthcare. Connect these cables following the installation procedures (e.g. wire power cables separately from signal cables).
4. Lay out the main equipment and other peripherals following the installation procedures described in the Option Installation manuals.

## General Notice

1. Designation of Peripheral Equipment Connectable to This Product.

   The equipment indicated in the Supplies/Accessories section can be hooked up to the product without compromising its EMC performance.

   Avoid using equipment not designated in the list. Failure to comply with this instruction may result in poor EMC performance of the product.

2. Notice against User Modification

   The user should never modify this product. User modifications may cause degradation in EMC performance.

   Modification of the product includes changes in:

   a. Cables (length, material, wiring, etc.)
   b. System installation/layout
   c. System configuration/components
   d. Securing system parts (cover open/close, cover screwing)

3. Operate the system with all covers closed. If a cover is opened for some reason, be sure to shut it before starting/ resuming operation.
4. Operating the system with any cover open may affect EMC performance.

## Peripheral Update for EC countries

The following is intended to provide the users in EC countries with updated information concerning the connection of the LOGIQ S7 Expert/Pro to image recording and other devices or communication networks.

### Peripheral used in the patient environment

The LOGIQ S7 Expert/Pro has been verified for overall safety, compatibility and compliance with the following image recording devices:

- SONY B/W Printer UP-D897
- SONY Color Printer UP-D25MD/D55

The LOGIQ S7 Expert/Pro has also been verified for compatibility, and compliance for connection to a local area network (LAN) via the rear panel Ethernet connection, provided the LAN components are IEC/EN 60950 compliant.

The LOGIQ S7 Expert/Pro may also be used safely while connected to devices other than those recommended above if the devices and their specifications, installation, and interconnection with the system conform to the requirements of IEC/EN 60601-1-1.

## Peripheral Update for EC countries (continued)

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (i.e., IEC60950 for data processing equipment and IEC60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the system standard IEC60601-1-1. Everyone who connects additional equipment to the signal input part or signal output part of the LOGIQ S7 Expert/Pro system configures a medical system, and is therefore responsible to ensure that the system complies with the requirements of the valid version of IEC60601-1-1. If in doubt, consult the technical service department or your local GE Healthcare representative.

General precautions for installing an alternate off-board, remote device or a network would include:

1. The added device must have appropriate safety standard conformance and CE Marking.
2. The total power consumption of the added devices, which connect to the LOGIQ S7 Expert/Pro and are used simultaneously, must be less than or equal to the rated supply of the LOGIQ S7 Expert/Pro.
3. There must be adequate heat dissipation and ventilation to prevent overheating of the device.
4. There must be adequate mechanical mounting of the device and stability of the combination.
5. Risk and leakage current of the combination must comply with IEC/EN 60601-1-1.
6. Electromagnetic emissions and immunity of the combination must conform to IEC/EN 60601-1-2.

General precautions for installing an alternate off-board, remote device or a network would include:

1. The added device(s) must have appropriate safety standard conformance and CE Marking.
2. The added device(s) must be used for their intended purpose having a compatible interface.
3. Signal or mains isolation devices and additional protective earth may be needed to assure compliance with IEC/EN 60601-1-1.

## Peripheral Update for EC countries (continued)

### Peripheral used in the non-patient environment

The LOGIQ S7 Expert/Pro has also been verified for compatibility, and compliance for connection to a USB HDD/ USB memory via the system USB port, provided the USB HDD/ USB memory are IEC/EN 60950 compliant.

The connection of equipment or transmission networks other than as specified in the user instructions can result in an electric shock hazard or equipment malfunction. Substitute or alternate equipment and connections requires verification of compatibility and conformity to IEC/EN 60601-1-1 by the installer. Equipment modifications and possible resulting malfunctions and electromagnetic interference are the responsibility of the owner.

## Declaration of Emissions

This system is suitable for use in the following environment. The user must assure that it is used only in the electromagnetic environment as specified.

Table 2-5: Declaration of Emissions

| Guidance and manufacturer's declaration - electromagnetic emissions | | |
|---|---|---|
| **The system is intended for use in the electromagnetic environment specified below. The user of the system should assure that it is used in such an environment.** | | |
| **Emission Type** | **Compliance** | **Electromagnetic Environment** |
| RF Emissions<br>CISPR 11 | Group 1 | This system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. |
| RF Emissions<br>CISPR 11 | Class B | This system is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes, provided the following warning is heeded:<br>WARNING: This system is intended for use by healthcare professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the system or shielding the location. |
| Harmonic Emissions<br>IEC 61000-3-2 | Class B | |
| Voltage Fluctuations/Flicker Emissions<br>IEC 61000-3-3 | Complies | |

## Declaration of Immunity

This system is suitable for use in the following environment. The user must assure that the system is used according to the specified guidance and only in the electromagnetic environment listed.

## Declaration of Immunity (continued)

Table 2-6: Declaration of Immunity

| Immunity Type | Equipment Capability | Regulatory Acceptable Level | EMC Environment and Guidance |
|---|---|---|---|
| IEC 61000-4-2<br>Static discharge (ESD) | ± 6 kV contact<br>± 8 kV air | ± 6 kV contact<br>± 8 kV air | Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. Mains power quality should be that of a typical commercial and/or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that the system be powered from a UPS or a battery. NOTE: UT is the a.c. mains voltage prior to application of the test level. Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial and/or hospital environment. Separation distance to radio communication equipment must be maintained according to the method below. Interference may occur in the vicinity of equipment marked with the symbol: |
| IEC 61000-4-4<br>Electrical fast transient/burst | ± 1 kV for mains<br>± 0.5 kV for ECG Cable | ± 1 kV for mains<br>± 0.5 kV for SIP/SOP | |
| IEC 61000-4-5 Surge Immunity | ± 1 kV differential<br>± 2 kV common | ± 1 kV differential<br>± 2 kV common | |
| IEC 61000-4-11<br>Voltage dips, short interruptions and voltage variations on mains supply | < $50_T$ (> 95% dip) for 0.5 cycle;<br>$400_T$ (60 0ip) for 5 cycles;<br>$700_T$ (30 0ip) for 25 cycles;<br>< $50_T$ (>95% dip) for 5 sec | < $50_T$ (> 95% dip) for 0.5 cycle;<br>$400_T$ (60 0ip) for 5 cycles;<br>$700_T$ (30 0ip) for 25 cycles;<br>< $50_T$ (>95% dip) for 5 sec | |
| IEC 61000-4-8<br>Power frequency (50/60 Hz) magnetic field | 3 A/m | 3 A/m | |
| IEC 61000-4-6<br>Conducted RF | 3 $V_{RMS}$<br>150 kHz - 80 MHz | 3 $V_{RMS}$<br>150 kHz - 80 MHz | |
| IEC 61000-4-3<br>Radiated RF | 3 V/m<br>80 MHz - 2.5 GHz | 3 V/m<br>80 MHz - 2.5 GHz | |

NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people. If noise generated from other electronic equipment is near the probe's center frequency, noise may appear on the image. Good power line isolation is required.

## Essential performance

The essential performance of the ultrasound unit is:

- The ability to display B-mode image as input for diagnosis.
- The ability to display M-mode image as input for diagnosis.
- The ability to display Doppler-mode image as input for diagnosis.
- The ability to display Color Flow-mode image as input for diagnosis.
- The display of acoustic power indexes as aid for safe use of ultrasound diagnostic (MI,TIS,TIB,TIC).
- The control of probe surface temperature as aid for safe use of ultrasound diagnostic.

## Patient Environmental Devices

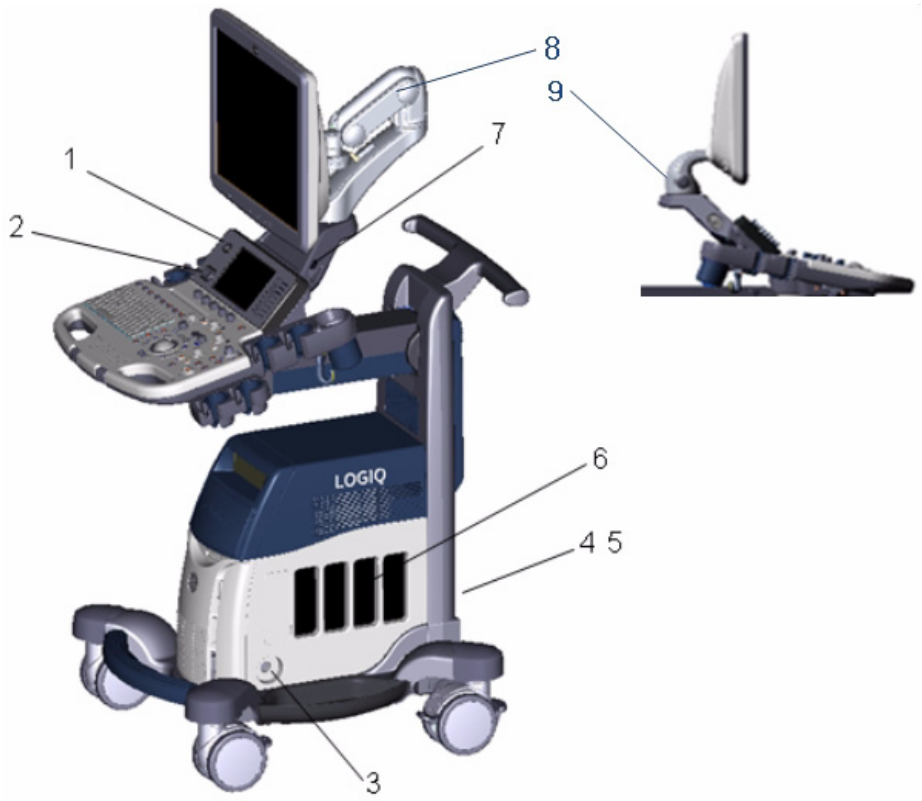



Figure 2-1. Patient Environmental Devices

1. Power On/Off
2. USB Port
3. CW pencil probe port
4. Power In/Out (Signal I/O port, Power line (AC~), Ground line, Power cable with Protective earth)
5. Signals I/O Port (USB Ports, Network Connector, Audio In/Out, HDMI)
6. Imaging probe ports
7. ECG Connector
8. Flexible arm
9. Fixed arm (LOGIQ S7 Pro only)

CAUTION

DO NOT place a PC printer and a card reader inside the patient environment.

## Acceptable Devices

The Patient Environmental devices shown on the previous page are specified to be suitable for use within the PATIENT ENVIRONMENT.

DO NOT connect any probes or accessories without approval by GE within the PATIENT ENVIRONMENT.

See ‘Peripheral Update for EC countries’ on *page 2-20 for more information.*

## Unapproved Devices

DO NOT use unapproved devices.

If devices are connected without the approval of GE, the warranty will be INVALID.

Any device connected to the LOGIQ S7 Expert/Pro must conform to the requirements for IEC or equivalent standards appropriate to devices.

## Accessories, Options, Supplies

Unsafe operation or malfunction may result. Use only the accessories, options and supplies approved or recommended in these instructions for use.

## Acoustic Output

Allowing the machine to transmit acoustic output with the probe not in use (or in its holder) can cause the transducer to build up heat. Always lower the acoustic power or freeze the image when not in use.

Located on the upper right section of the system display monitor, the acoustic output display provides the operator with real-time indication of acoustic levels being generated by the system. See the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information. This display is based on NEMA/AIUM Standards for Real-time Display of Thermal and Mechanic Acoustic Output Indices on Diagnostic Ultrasound Equipment.

## Acoustic Output Display Specifications

The display consists of three parts: Thermal Index (TI), Mechanical Index (MI), and a relative Acoustic Output (AO) value. Although not part of the NEMA/AIUM standard, the AO value informs the user of where the system is operating within the range of available output.

The TI and MI are displayed at all times. The TI display starts at a value of 0.0 and increments in steps of 0.1 The MI display values between 0 and 0.4 increment in steps of 0.01 and for values greater than 0.4, increments in steps of 0.1.

### Thermal Index

Depending on the examination and type of tissue involved, the TI parameter will be one of three types:

- **Soft Tissue Thermal Index (TIS)**. Used when imaging soft tissue only, it provides an estimate of potential temperature increase in soft tissue.
- **Bone Thermal Index (TIB)**. Used when bone is near the focus of the image as in the third trimester OB examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.
- **Cranial Bone Thermal Index (TIC)**. Used when bone is near the skin surface as in transcranial examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.

## Acoustic Output Display Specifications (continued)

### Mechanical Index

MI recognizes the importance of non-thermal processes, cavitation in particular, and the Index is an attempt to indicate the probability that they might occur within the tissue.

### Changing the Thermal Index Type

You can select the displayed TI type on Utility -> Imaging -> B-Mode. This preset is application dependent so each application could specify a different TI type.

Display precision is ±0.1 and accuracy is ±50%. Accuracy of the power output displayed value on the touch panel is ±10%.

## Controls Affecting Acoustic Output

The potential for producing mechanical bioeffects (MI) or thermal bioeffects (TI) can be influenced by certain controls.

*Direct.* The Acoustic Output control has the most significant effect on Acoustic Output.

*Indirect.* Indirect effects may occur when adjusting controls. Controls that can influence MI and TI are detailed under the Bioeffects portion of each control in the Optimizing the Image sections.

Always observe the Acoustic Output display for possible effects.

## Best practices while scanning

HINTS

Raise the Acoustic Output only after attempting image optimization with controls that have no effect on Acoustic Output, such as Gain and TGC.

*NOTE: Refer to the Optimizing the Image sections for a complete discussion of each control.*

WARNING

Be sure to have read and understood control explanations for each mode used before attempting to adjust the Acoustic Output control or any control that can effect Acoustic Output.

Acoustic Output Hazard

Use the minimum necessary acoustic output to get the best diagnostic image or measurement during an examination. Begin the exam with the probe that provides an optimum focal depth and penetration.

## Acoustic Output Default Levels

In order to assure that an exam does not start at a high output level, the LOGIQ S7 Expert/Pro initiates scanning at a reduced default output level. This reduced level is preset programmable and depends upon the exam category and probe selected. It takes effect when the system is powered on or ***New Patient*** is selected.

To modify acoustic output, adjust the Power Output level on the touch panel.

# Device Labels

## Label Icon Description

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 2-7: Label Icons

| Label/Icon | Purpose/Meaning | Location |
|---|---|---|
| Identification and Rating Plate | Manufacturer's name and address | Rating Plate |
| Identification and Rating Plate | Date of manufacture | Rating Plate |
| | Serial Number | Rating Plate |
| | Catalog Number | Rating Plate |
| Type/Class Label | Used to indicate the degree of safety or protection. | Rear of the system |
| Rx Only | United States only<br>Prescription Requirement label | Rear of the system |
| CE 0459 | CE Mark<br>The CE Mark of Conformity indicates this equipment conforms with the Council Directive 93/42/EEC. | Rear of the system |

Table 2-7: Label Icons (Continued)

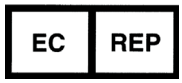
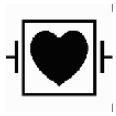
| Label/Icon | Purpose/Meaning | Location |
|---|---|---|
|   | Authorized European Representative address | Rear of the system |
| IP Code (IPX8) | Indicates the degree of protection provided by the enclosure per IEC60 529. Can be used in operating room environment. | Footswitch |
| | ECG symbol | Right side of the OPIO |
| | Type BF Applied Part (man in the box) symbol is in accordance with IEC 60878-02-03. | Probe marked Type BF |
|  | Defibrillation-proof CF applied part | ECG connector |
| | Follow instruction for use. | Rear of the system<br>Probe connector |
| | “General Warning Sign” | Rear of the system |
| | “Warning” - Dangerous voltage” (the lightning flash with arrowhead) is used to indicate electric shock hazards. | Internal |
| | “Mains OFF” indicates the power off position of the mains power breaker. | Rear of the system |
|  | “Mains ON” indicates the power on position of the mains power breaker. | Rear of the system |

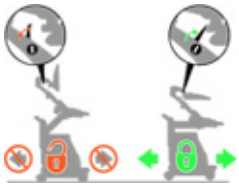
Table 2-7: Label Icons (Continued)

| Label/Icon | Purpose/Meaning | Location |
|---|---|---|
| | “ON” indicates the power on position of the power switch.<br>**CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply. | Operator control panel |
| | “Protective Earth” indicates the protective earth (grounding) terminal. | Internal |
| | “Equipotentiality” indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.<br>Connection of additional protective earth conductors or potential equalization conductors is not necessary in most cases and is only recommended for situations involving multiple equipment in a high-risk patient environment to provide assurance that all equipment is at the same potential and operates within acceptable leakage current limits. An example of a high-risk patient would be a special procedure where the patient has an accessible conductive path to the heart such as exposed cardiac pacing leads. | Rear of the system |
| | This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment. | Rear of the system |
| | | Probe connector |

Table 2-7: Label Icons (Continued)

| Label/Icon | Purpose/Meaning | Location |
|---|---|---|
| | Indicates the presence of hazardous substance(s) above the maximum concentration value. Maximum concentration values for electronic information products, as set by the People's Republic of China Electronic Industry Standard SJ/T11364-2006, include the hazardous substances of lead, mercury, hexavalent chromium, cadmium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE). "10" indicates the number of years during which the hazardous substance(s) will not leak or mutate so that the use of this product will not result in any severe environmental pollution, bodily injury, or damage to any assets. | Probe connector |
| | Indicates the presence of hazardous substance(s) above the maximum concentration value. Maximum concentration values for electronic information products, as set by the People's Republic of China Electronic Industry Standard SJ/T11364-2006, include the hazardous substances of lead, mercury, hexavalent chromium, cadmium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE). "20" indicates the number of years during which the hazardous substance(s) will not leak or mutate so that the use of this product will not result in any severe environmental pollution, bodily injury, or damage to any assets. | Rear of the system |
| | Do not use the following devices near this equipment: cellular phone, radio receiver, mobile radio transmitter, radio controlled toy, broadband power lines, etc. Use of these devices near this equipment could cause this equipment to perform outside the published specifications. Keep power to these devices turned off when near this equipment. | Rear of the system |

Table 2-7: Label Icons (Continued)

| Label/Icon | Purpose/Meaning | Location |
|---|---|---|
| | This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this system, the backlight lamps in the monitor display, contain mercury.) | Rear of the system |
| | UL conformity mark according to UL 60601-1 and CAN/CSA C22/2 NO. 601.1:. | Rear of the system |
|  | How to lock Operator Panel prior to transport | Rear of the system. |
| | **DO NOT** place a finger, hand or any object on the joint of the monitor or monitor arm to avoid injury when moving the monitor and monitor arm. | Rear of the LCD monitor. |
| | DO NOT push the system. Use the handle to push/pull the system, e.g., DO NOT use the LCD. Failure to do so may cause serious injury or system damage. | Rear of the system |
| | Caution | Probe connector |

## Label location

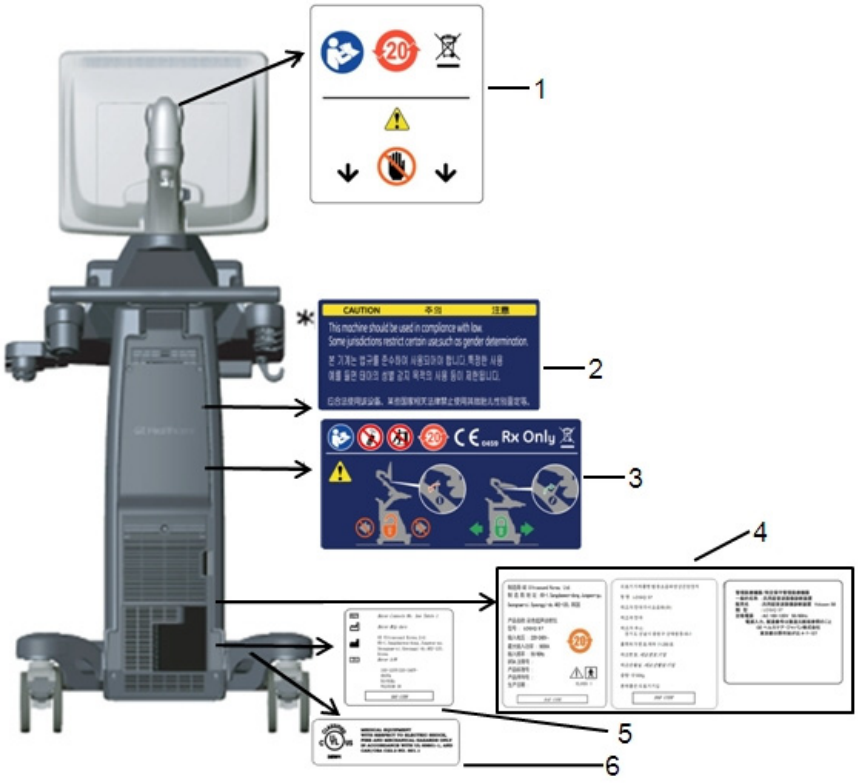



Figure 2-2. Label location

* Required for Asia.

1. LCD Caution Label
2. Gender Caution Label (Only for India, China, Korea)
3. Multi Caution Label
4. LOGIQ S7 Expert/Pro Rating Label (For China, Korea, Japan)
5. LOGIQ S7 Expert/Pro Rating Label
6. UL Label

Figure 2-3. LOGIQ S7 Expert/Pro Rating label

## Label on the packing box

Figure 2-4. Package label

This label is printed on the packing box of the system to indicate the humidity, temperature and air pressure condition for the storage and shipment.

# *Chapter 3*

# Preparing the System for Use

*Describes the site requirements, console overview, system positioning/transporting, powering on the system, adjusting the display monitor, probes and operator controls.*

# Site Requirements

## Introduction

All the warnings in the Safety chapter should be read and understood before operating the unit.

Do not unpack the LOGIQ S7 Expert/Pro. This must be performed by qualified service personnel only.

Always use the system on a flat surface in the patient environment.

Do not attempt to install the system alone. General Electric, Affiliate, or Distributor Field Engineers and Application Specialists will install and setup the system. See ‘Contact Information’ on *page 1-6 for more information.*

Perform regular preventive maintenance. See ‘System Care and Maintenance’ on *page 18-13 for more information.*

Maintain a clean environment. Turn off, and if possible, disconnect the system before cleaning the unit. See ‘Cleaning the system’ on *page 18-16 for more information.*

## Training

Only qualified physicians or sonographers should perform ultrasound scanning on human subjects for medical diagnostic reasons. Request training, if needed.

## Before the system arrives

The ultrasound unit must operate within the proper environment and in accordance with the requirements described in this section. Before using the system, ensure that the requirements are met.

### Power Requirements

- A separate power outlet with a 15 amp circuit breaker.
- Frequency: 50 Hz, 60 Hz (+/-2%)
- 100V - 120V AC/220V - 240V AC

### Electromagnetic interferences

This medical equipment is approved, in terms of the prevention of radio wave interference, to be used in hospitals, clinics and other institutions which are environmentally qualified. The use of this equipment in an inappropriate environment may cause some electronic interference to radios and televisions around the equipment.

Ensure that the following is provided for the new system:

- Take precautions to ensure that the console is protected from electromagnetic interference.

  Precautions include:

  - Operate the console at least 15 feet away from motors, typewriters, elevators, and other sources of strong electromagnetic radiation.
  - Operation in an enclosed area (wood, plaster or concrete walls, floors and ceilings) helps prevent electromagnetic interference.
  - Special shielding may be required if the console is to be operated in the vicinity of radio broadcast equipment.

Do not operate the system in the vicinity of a heat source, of strong electric or magnetic fields (close to a transformer), or near instruments generating high-frequency signals, such as HF surgery. These can affect the ultrasound images adversely.

## Environmental Requirements

The system should be operated, stored, or transported within the parameters outlined below. Either its operational environment must be constantly maintained or the unit must be turned off.

Table 3-1: System Environmental Requirements

| | **Operational** (with probe) | **Storage** (LOGIQ S7 Expert/Pro) | **Transport** (LOGIQ S7 Expert/Pro) |
|---|---|---|---|
| Temperature | 10° - 35°C<br>50° - 95°F | -10° - 50°C<br>14° - 122°F | -10° - 50°C<br>14° - 122°F |
| Humidity | 30 - 80%<br>non-condensing | 10 - 90%<br>non-condensing | 10 - 90%<br>non-condensing |
| Pressure | 700 - 1060hPa | 700 - 1060hPa | 700 - 1060hPa |

Ensure that the probe face temperature does not exceed the normal operation temperature range.

### Operating Environment

Ensure that there is sufficient air flow around the ultrasound unit when installed in a fixed location.

Do not cover the ventilation holes of the LOGIQ S7 Expert/Pro.

### Operating altitude

Maximum operating altitude for use: 3000m

**Probe**

Probes should be stored or transported within the parameters outlined below.

Table 3-2: 2D Probe Environmental Requirements

| | Storage | Transport |
|---|---|---|
| **Temperature** | 0 to 55 degrees C<br>32 to 131 degrees F | -40 to 55 degrees C<br>-40 to 131 degrees F |
| **Humidity** | 5 - 85%<br>non-condensing | 5 - 85%<br>non-condensing |
| **Pressure** | 700 - 1060hPa | 700 - 1060hPa |

# Console Overview

## Console Graphics

The following are illustrations of the console:

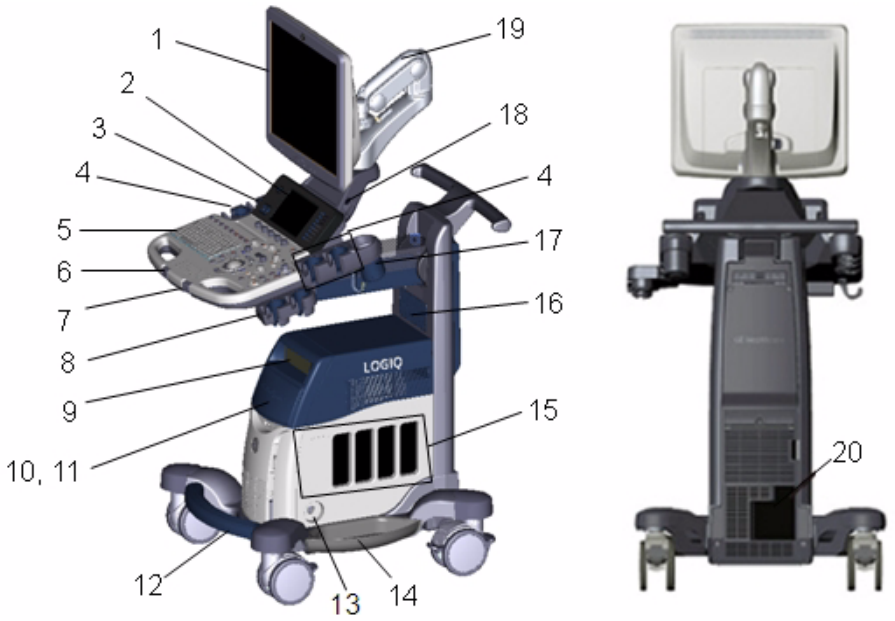



Figure 3-1. LOGIQ S7 Expert/Pro System (mid cabinet type example)

1. LCD Monitor
2. Touch panel
3. USB port
4. Probe holder
5. A/N keyboard
6. Control panel swivel button
7. Control panel up/down button
8. Probe holder (Option)
9. DVD Drive
10. BW printer
11. Color printer or Drawer
12. Foot rest
13. CW pencil probe port
14. Side tray (Option)
15. Probe port - 4 active probe ports
16. Audio speaker
17. Gel warmer
18. ECG connector
19. Articulating arm
20. External I/O panel

DO NOT touch the patient and any of the connectors on the ultrasound unit simultaneously, including ultrasound probe connectors.

DO NOT touch the conducting parts of the USB, Ethernet, Video, Audio cables when connecting equipment to the unit.

### Mid cabinet type

Figure 3-2. Mid cabinet

1. DVD Drive
2. B/W Printer or Color Printer

## Speakers

Audio is provided by speakers. For the location of the speaker, see Figure 3-1 *on page 3-6*.

*NOTE: You make volume corrections on the Utility touch panel (Master Volume, Effects Volume).*

- Audio Doppler operation
- Audio playback of recorded scan sessions
- Audio error notification.

## Peripheral/Accessory Connection

### Peripheral/Accessory Connector Panel

LOGIQ S7 Expert/Pro peripherals and accessories can be properly connected using the rear connector panel.

CAUTION

For compatiblity reasons, use only GE approved peripherals or accessories.

**DO NOT** connect any probes or accessories which are not approved for use by GE.

CAUTION

The connection of equipment or transmission networks other than as specified in these instructions can result in electric shock hazard. Alternate connections will require verification of compatibility and conformity to IEC/EN 60601-1-1 by the installer.

CAUTION

Do not touch the conducting parts of the USB or Ethernet cables when connecting equipment to the unit.

CAUTION

When using peripheral device, observe all warnings and cautions given in peripheral operator manuals.

**Peripheral/Accessory Connector Panel (continued)**

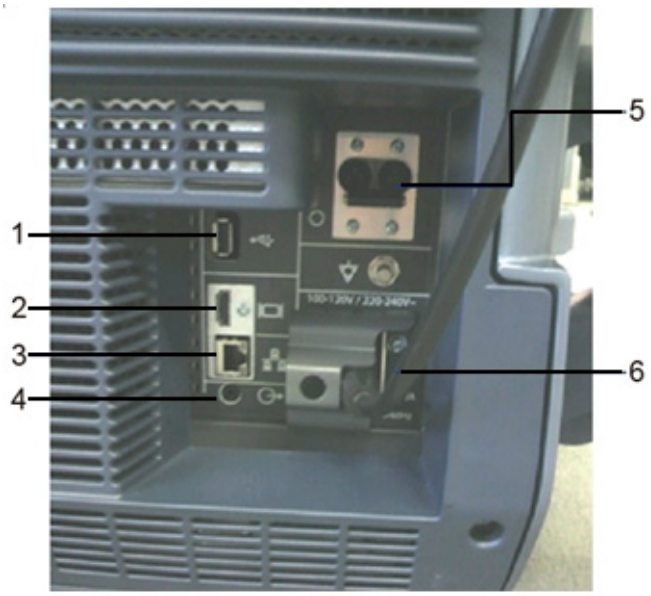



Figure 3-3. Peripheral/Accessory Connector Panel

| | | |
|---|---|---|
| 1. | USB Port | USB 1.1 (Bacl) 2.0 (Front) |
| 2. | HDMI connector | HDMI connector for external monitor |
| 3. | Ethernet | LAN for InSite, DICOM, Network storage Connection (RJ45) |
| 4. | Audio | Audio Line Out (3.5mm pin jack) |
| 5. | Circuit breaker | 15A |
| 6. | AC Inlet | 100-120V/200-240V |

### Wired Footswitch (Option)

You can attach this Footswitch to the system by connecting it to any USB port on the system.

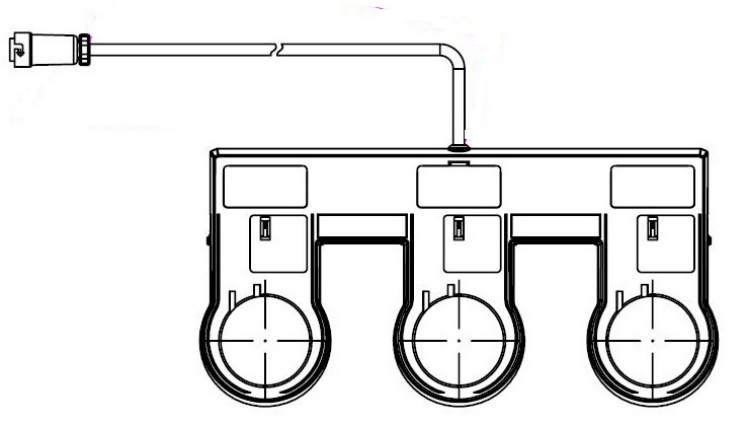


Figure 3-4. 3-button Footswitch

This is a 3-pedal Footswitch. You can configure its functionality via the Utility -> Applications -> Footswitch parameters.

CAUTION

When using the Footswitch, DO NOT hold down the footswitch pedal. Press and release the Footswitch pedal. Pushing and holding down the pedal behaves the same way as pushing and holding down a key on the keyboard.

### Storage areas

### Probe holder and Gel warmer

Figure 3-5. Probe holder and Gel warmer (Gel holder)

a. Probe holder
b. Gel warmer (Gel holder)

Turn on the system, then turn on the gel warmer.

Figure 3-6. On/Off switch of Gel warmer

a. On/Off switch (Left: Off, Right: On)

**Side tray (Option)**

Figure 3-7. Side tray

a. Side tray

CAUTION

DO NOT place the probe, the footswitch and/or any peripherals on the side tray when moving/transporting the system.

**Probe holder (Option)**

Figure 3-8. Probe holder (Option)

a. Optional probe holder

**Attachment for small probe (Option)**

Figure 3-9. Attachment (Option)

Push the attachment into the probe holder as below.

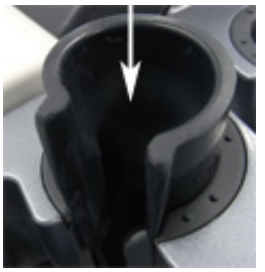


Figure 3-10. Push the attachment

Figure 3-11. Attachment in the proper position

# Powering the System

## Connecting the System

To avoid risk of fire, the system power must be supplied from a separate, properly rated outlet. See ‘Before the system arrives’ on *page 3-3 for more information.*

Under no circumstances should the AC power plug be altered, changed, or adapted to a configuration rated less than specified. Never use an extension cord or adapter plug.

To help assure grounding reliability, connect to a “hospital grade” or “hospital only” grounded power outlet.

Use the appropriate power cord provided by or designated by GE Healthcare.

Ensure that the retaining clamp for the power plug is fixed firmly.

Use caution to ensure that the power cable does not disconnect during system use.

If the system is accidentally unplugged, data may be lost.

WARNING

Failure to provide an adequate earth circuit can cause electrical shock, resulting in serious injury.

Connection of additional protective earth conductors or potential equalization conductors is not necessary in most cases and is only recommended for situations involving multiple equipment in a high-risk patient environment to provide assurance that all equipment is at the same potential and operates within acceptable leakage current limits. An example of a high-risk patient would be a special procedure where the patient has an accessible conductive path to the heart such as exposed cardiac pacing leads.

## Connecting the System (continued)

### Voltage level check

Check the rating label on the rear side of the system. Check the voltage range indicated on the label.

### Connecting to the electrical outlet

WARNING

POWER OUTAGE MAY OCCUR. The ultrasound unit requires a dedicated single branch circuit. To avoid circuit overload and possible loss of critical care equipment, make sure you DO NOT have other equipment operating on the same circuit.

To connect the system to the electrical supply:

1. Ensure that the wall outlet is of the appropriate type.
2. Ensure that the power switch is turned off.
3. Unwrap the power cable. Make sure to allow sufficient slack in the cable so that the plug is not pulled out of the wall if the system is moved slightly.
4. Attach the power plug to the system and secure it in place by using the retaining clamp.
5. Push the power plug securely into the wall outlet.

*NOTE: Do not use an extension cord or adapter plug.*

CAUTION

Disconnect the plug from the wall outlet in case an emergency should occur. Ensure easy access to the power outlet.

## Power On

CAUTION

Press the ***Power On/Off*** switch to turn the power on. The circuit breaker must also be in the on position. For circuit breaker location, see ‘Circuit Breaker’ on *page 3-24* for more information.

### To turn on the system

1. Ensure that the unit is properly plugged into an AC outlet of sufficient capacity.
2. Turn on the breaker at the back of the system (refer to Figure 3-14). The On/Off switch turns blue.
3. Momentarily press the On/Off switch (refer to Figure 3-12). The switch turns green.
4. The system should now go through its boot-up process with no further user intervention (approximately 120 seconds).

Figure 3-12. Power On/Off Switch Location

## Power Up Sequence

The system is initialized. During this time:

- The system boots up and the status is reflected on the monitor.
- Probes are initialized for immediate operation.

*NOTE: If no probe is connected, the system goes into freeze mode.*

- Peripheral devices are activated on power up.

After initialization is complete, all lighted controls on the Control Panel light and the default B-Mode screen is displayed on the monitor.

## Password Protection

### Login

Personal IDs and associated passwords can be preset on the LOGIQ S7 Expert/Pro.

If the Use Auto Logon preset is blank, you are prompted to login.

Figure 3-13. Operator Login Window

1. **Operator**: Select the Operator.
2. **Password**: Enter Operator's password (optional).
3. Select type of Logon or Cancel.
   - **Emergency**: Data stored only for the duration of the current examination.
   - **OK**: Standard logon
   - **Cancel**: Cancel logon

### Logoff

To logoff, press the **Power On/Off** switch momentarily and a SYSTEM-EXIT window appears. Select ***Log-off***.

## Power Off

For optimum system operation, we recommend that you restart the system at least once every 24-hour period. If you shut down the system at the end of the day, no other action is needed.

CAUTION

**DO NOT** turn off the circuit breaker before the monitor display turns off.

Data may be lost or system software damaged if the circuit breaker is turned off before the system shuts down.

To power off the system:

1. When you shutdown the system, enter the scan screen and lightly press the **Power On/Off** switch at the front of the system once. The System-Exit window is displayed.

*NOTE: DO NOT press and hold down the Power On/Off switch to shutdown the system.*

2. Using the **Trackball**, select Shutdown.

   The shutdown process takes a few seconds and is completed when the control panel illumination shuts down.

*NOTE: DO NOT select Exit for Shutdown. Exit is only available to Service representative.*

*NOTE: If the system has not fully shut down in 60 seconds in the power-off sequence, press and hold down the On/Off switch until the system shuts down.*

3. Disconnect the probes.

   Clean or disinfect all probes as necessary. Store them in their shipping cases to avoid damage.

## Sleep Mode

Use Sleep Mode when you do a portable exam in order to reduce the time to start up the system. When you use Sleep Mode, it takes ~90 seconds to start up the system versus 2-3 minutes.

To activate Sleep Mode,

1. Press the On/Off switch and select ***Sleep***.
2. One minute after the monitor goes black, unplug the power cord from the wall.
3. To exit out of Sleep Mode, press the On/Off switch.

c CAUTION

You need to wait at least one minute after the monitor goes black before unplugging the power cable. The system is still in the process of going into Sleep Mode after the monitor goes black.

w WARNING

Sleep mode is not intended to replace the shutdown process. The system should be fully shutdown every day.

## Crash Recovery Instructions

In cases where the system detects an internal error, the system may reboot on its own. If this happens, the system automatically returns to the start-up screens, taking approximately four minutes. All images and measurements, except for generic worksheets, are preserved in the system.

When the system returns, the system displays the message “Do you want continue the exam?”. Respond to the prompt to continue the current patient. Check that all images and measurements have been preserved in the system. Then select “End Exam” to the current patient once and you need to manually reset the system. Simply hold down the power switch to initiate a normal power down sequence. After the system has completely shut down, restart the system using the standard power-up sequence. Then resume the exam.

*NOTE: If the image is not updated properly when the system is up, shut down the system again.*

*NOTE: Generic worksheets are not saved if the system crashes before you save it.*

WARNING

The system crash may cause the internal HDD corruption. Avoid using the internal HDD as a permanent storage device. Backup data on a regular basis.

## Circuit Breaker

The Circuit Breaker is located at the rear panel of the system. On supplies main power to all internal systems. Off removes main power from all internal systems. The circuit breaker automatically shuts off power to the system in case of a power overload.

If a power overload occurs:

1. Turn off all peripheral devices.
2. Reactivate the Circuit Breaker switch.

The Circuit Breaker switch should stay in the **On** position; **DO NOT** hold the switch in the **On** position. If the Circuit Breaker switch remains **On**, follow the Power On procedure previously described.

Figure 3-14. Circuit Breaker (located on the rear panel)

1. On position
2. Off position

*NOTE: If the Circuit Breaker switch does **not** remain in the **On** position or trips again:*

1. Disconnect the Power Cable.
2. Call Service immediately.

***DO NOT*** attempt to use the system.

# Probes

## Introduction

Only use approved probes.

## Selecting probes

- Always start out with a probe that provides optimum focal depths and penetration for the patient size and exam.
- Begin the scanning session by choosing the correct application and preset for the examination by selecting ***Model***.
- Begin the scan session using the default Power Output setting for the probe and exam.

*NOTE: Selecting a new probe unfreezes the image.*

## Connecting the Probe

CAUTION

Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, seal, cable and connector. DO NOT use a transducer which appears damaged until functional and safe performance is verified. A thorough inspection should be conducted during the cleaning process.

CAUTION

Remove any dust or foam rests from the probe pins.

CAUTION

Fault conditions can result in electric shock hazard. Do not touch the surface of probe connectors which are exposed when the probe is removed. Do not touch the patient when connecting or disconnecting a probe.

Probes can be connected at any time, regardless of whether the console is powered on or off. To ensure that the ports are not active, place the system in the image freeze condition.

Figure 3-15. Probe port

a. Active probe port
b. Pencil probe port

## Connecting the Probe (continued)

To connect a probe:

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cord.
3. Put the probe in the probe holder.

CAUTION

DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage. Use the integrated cable management hook to wrap the cord.

4. Hold the probe connector vertically with the cable pointing upward.
5. Turn the connector locking handle to the left.
6. Align the connector with the probe port and carefully push into place.
7. Turn the connector locking handle to the right to secure the probe connector.
8. Carefully position the probe cord so it is free to move and is not resting on the floor.

### Connecting the CW Pencil Probe

Insert the probe connector into the probe port all the way seated in. Carefully position the probe cord so it is free to move and is not resting on the floor.

## Cable Handling

Take the following precautions with probe cables:

- Keep free from wheels.
- Do not bend the cable acutely
- Avoid crossing cables between probes.

## Activating the Probe

To activate the probe, select the appropriate probe from the probe indicators on the touch panel.

The probe's default settings for the mode and selected exam are used automatically.

Make sure that the probe and application names displayed on the screen correspond to the actual probe and application selection.

## Deactivating the Probe

When deactivating the probe, the probe is automatically placed in standby mode.

To deactivate a probe:

1. Ensure the LOGIQ S7 Expert/Pro is in freeze mode. If necessary, press the **Freeze** key.
2. Gently wipe the excess gel from the face of the probe.
3. Ensure that the probe is placed gently in the probe holder.

## Disconnecting the Probe

Probes can be disconnected at any time. However, the probe should not be active when disconnecting the probe.

1. Ensure the probe is deactivated.  Deactivate by selecting another probe or pressing Freeze.
2. Move the probe locking handle to the left.
3. Pull the probe connector straight out of the probe port carefully.

DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage. Use the integrated cable management hook to wrap the cord.

4. Ensure the cable is free.
5. Be sure that the probe head is clean before placing the probe in its storage box.

## Transporting Probes

- Secure the probe in its holder for moving short distances.
- When transporting a probe a long distance, store it in its carrying case.

## Storing the Probe

It is recommended that all probes be stored in the provided carrying case for probe storage.

Carrying case:

- First place the probe connector into the carrying case.
- Carefully wind the cable into the carrying case.
- Carefully place the probe head into the carrying case. DO NOT use excessive force or impact the probe head.

**DO NOT** store probes in the side tray. To avoid damage, store the probe in its carrying case.

# System Positioning/Transporting

## Before moving the system

When moving or transporting the system, follow the precautions below to ensure the maximum safety for personnel, the system, and other equipment.

CAUTION

When the system is not in use AND/OR before moving/ transporting the system, make sure that the control panel/ monitor arm locks firmly and flip down the monitor to prevent system damage.

CAUTION

**DO NOT** place probes or the footswitch into the side tray when moving/transporting the system. This is not a storage space for probes, footswitch and any peripheral devices.

CAUTION

If you park the system on a slippery slope, you MUST use the brakes on the wheel.

CAUTION

This equipment is not to be used during transportation (e.g. ambulance cars, aircraft).

CAUTION

DO NOT attempt to move the console using any cables or fixtures, such as the probe connectors.

CAUTION

Handle carefully. A drop of more than 5 cm can cause mechanical damages.

## Before moving the system (continued)

1. Adjust the LCD monitor and control panel to their lowest positions. Flip down the LCD monitor and lock the monitor arm.

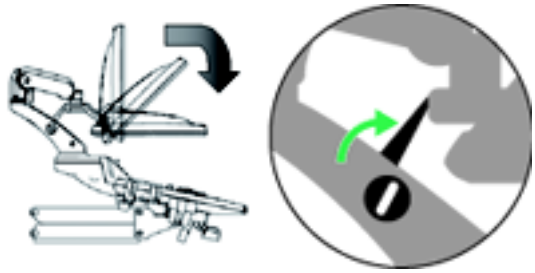


Figure 3-16. Flip down the monitor and lock the monitor arm

2. Turn the system off, including the circuit breaker (see 'Power Off' on *page 3-21 for more information*, and removed the plug from the wall.
3. All cables from off-board peripheral devices must be disconnected from the console.
4. Disconnect the footswitch from the console.
5. Wind the power cable around the cable hook.

*NOTE:* *To prevent damage to the Power Cord, **DO NOT** pull excessively on the cord or make sharp bends while wrapping.*

6. Connect all probes to be used while off site. Ensure that probe cables are out of the way from the wheels and not protruding beyond the console. Use the probe management hooks located below the Operator Panel to further secure the probe cables.

   Store all other probes in their original cases or in soft cloth or foam to prevent damage.
7. Put the coupling gel in the gel holder.
8. Ensure that no loose items are left on the console and unlock the wheels.

## Wheels

Examine the wheels frequently for any obvious defects that could cause them to break or bind.

Each wheel has an independent brake pedal. A left rear wheel also has a swivel lock.

Figure 3-17. Wheel lock and Swivel lock

1. Unlocked
2. Total lock engaged
3. Wheel Lock Engaged
4. Swivel Lock Engaged

Moving Hazard

Never move the system with locked wheels.

CAUTION

When two or more people are releasing the wheel controls with the front and rear wheels, take extra precaution to prevent unexpected movement which could result in possible toe injuries.

CAUTION

If you use/park the system on a slippery slope, you MUST use the brakes on the wheel.

## Moving the System

1. The system weighs approximately 90 kg (198 lbs.), depending on which peripherals are loaded onto the system. To avoid possible injury and equipment damage:
   - Be sure the pathway is clear.
   - Limit movement to a slow careful walk.
   - Use two or more persons to move the system on inclines or long distances.
2. Grasp the rear handle bar and push the system.

*NOTE: The swivel lock on the left-rear caster helps control the system while moving.*

Moving the system, no incline

Moving the system on incline

- Take extra care when moving the system long distances and on inclines (>5 degrees). Ask for help if necessary.
- DO NOT attempt to move the console using any cables or fixtures, such as the probe connectors.
- DO NOT attempt to move the system by pulling cables or belts placed around the monitor and/or monitor arm.
- Use the foot brake (pedal) when necessary.
- Avoid ramps that are steeper than ten degrees to avoid tipping over the system.

*NOTE: Wheel chair ramps are usually less than five degrees.*

## Moving the System (continued)

- Utilize additional care and personnel when loading into a vehicle for transport.
- Do not let the system strike walls or door frames.
- Use extra care when crossing door or elevator thresholds.

*NOTE: When you cross the threshold with the LOGIQ S7 Expert/Pro, move quickly.*

3. Once the destination is reached, lock the wheels.

## Transporting the System

Use extra care when transporting the system using vehicles. In addition to the instructions used when moving the system (see ‘Before moving the system’ on *page 3-31* for more information), also perform the following:

- Only use vehicles that are designed for transport of the LOGIQ S7 Expert/Pro system.
- Ensure that the transporting vehicle can handle the weight of the system plus the passengers.
- Employ two to three persons to load and unload safely from a vehicle.
- Ensure that the load capacity of the lift (a minimum of 90kg [198 lbs] is recommended) is capable of handling the weight of the system.
- Ensure that the lift is in good working order.
- Secure system with straps or as directed otherwise to prevent motion during transport.
- Prevent vibration damage by driving cautiously. Avoid unpaved roads, excessive speeds, and erratic stops or starts.

WARNING

Never ride on the lift with the system. A person's weight coupled with the weight of the system may exceed the load capacity of the lift.

## Load the system onto a vehicle

1. Load and unload the system to a vehicle parked on a level surface.
2. Secure the system while it is on the lift so that it cannot roll. Use either wood chocks, restraining straps, or other similar types of constraints. Do not attempt to hold it in place by hand.
3. Load the unit aboard the vehicle carefully and over its center of gravity. Keep the unit still and upright.

*NOTE: Do not lay the unit down on its side.*

4. Ensure that the unit is secured inside the vehicle. Strap the LOGIQ S7 Expert/Pro with belt to prevent movement while in transit.

   Twist the belt around the rear handle (1) and the footrest/ caster (2).

*NOTE: DO NOT restrain the LOGIQ S7 Expert/Pro at the LCD monitor or the monitor neck using a belt.*

Figure 3-18. Wrapping position of the belt

5. Drive cautiously to prevent vibration damage.

## Reinstalling at a new location

1. When the unit is in place at a new location, lock the wheel brakes.
2. Follow the installation procedure described in ‘Connecting the System’ on *page 3-16*.

### Acclimation Time

After being transported, the unit requires one hour for each 2.5 degree increment when its temperature is below 10 degree C or above 40 degree C.

Table 3-3: System Acclimation Time Chart

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Degree C** | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 |
| **Degree F** | 140 | 131 | 122 | 113 | 104 | 95 | 86 | 77 | 68 | 59 | 50 |
| **hours** | 8 | 6 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | |
| **Degree C** | 5 | 0 | -5 | -10 | -15 | -20 | -25 | -30 | -35 | -40 | |
| **Degree F** | 41 | 32 | 23 | 14 | 5 | -4 | -13 | -22 | -31 | -40 | |
| **hours** | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | |

# Operator Controls

## Control Panel Map

Controls are grouped together by function for ease of use. See the callout for this figure onthe following page.

Figure 3-19. Console Panel Map

## Control Panel Map (continued)

1. Power On/Off
2. Touch panel
3. TGC
4. Rotary controls
5. User Define keys
6. BT Keys
7. A/N Keyboard
8. Pointer key
9. Clear key
10. Comment key
11. Body Pattern/Ellipse
12. Measure key
13. CWD key
14. Mode/Gain/XYZ Controls
15. Reverse key
16. TVI/PDI key
17. Zoom
18. B-Flow key
19. Left/Right key
20. Trackball/Trackball Keys
21. P1 (Print) key
22. Freeze key
23. P2 and P3 key
24. Auto (AO and CHI)
25. Steer/Width/Depth

CAUTION

Do not apply too much force when adjusting the TGC slide pots as this could damage the slide pots.

## Control panel adjustment

CAUTION

To avoid injury or damage, make sure nothing is within the range of motion before moving the control panel. This includes both objects and people.

The control panel position can be adjusted for easy viewing and easy-to-use.

### To raise/lower the Control panel (LOGIQ S7 Expert only)

1. Push the up/down button of the right front handle and hold it.
2. Release the button at the desired height.

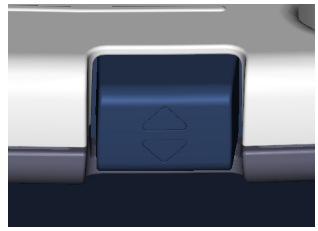


Figure 3-20. Up/Down Control

Figure 3-21. Up/Down

### To swivel the Control panel

1. Push the swivel button of left front handle and hold it.
2. Release the button at the desired position.

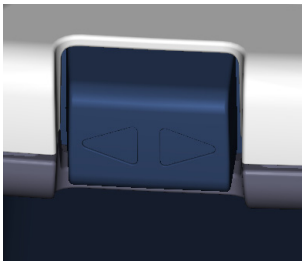


Figure 3-22. Swivel Control

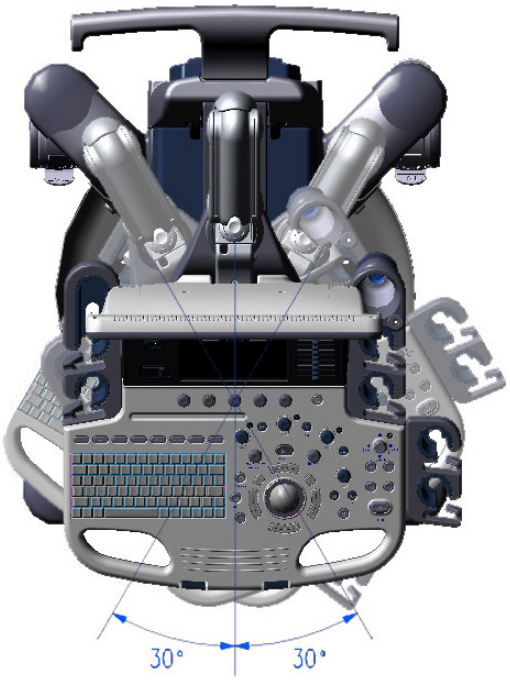



Figure 3-23. Swivel range

## Key Illumination

All the keys on the front panel, except for the keyboard, and some rotaries have a two-level backlight capability. The following backlighting indicates availability.

The keyboard area must have task lighting or equivalent to allow operation in a dark room.

Table 3-4: Key Illumination

| Backlight Capability | Availability |
|---|---|
| OFF | Function is not available |
| Green | Activated/ON |
| Blue | Inactive/Available |

## Keyboard

| | |
|---|---|
| | The standard alpha-numeric keyboard has some special functions. |
| **Esc** | Exit current display screen. |
| **Help (F1 Key)** | Access Online help / user manual. |
| **Arrow (F2 Key)** | Annotation arrow. |
| **Eject (F3 Key)** | Eject media. |
| **Spooler (F4 Key)** | Activates DICOM Job Spooler screen. |
| **Create a Fast Key (F5 Key)** | Creates a Fast Key. |
| **Play a Fast Key (F6 Key)** | Plays a Fast Key. |
| **Home/Set Home (F7 Key)** | Move annotation cursor to home position; shift+key to set current annotation cursor position as the new home position. |
| **Text1/Text2 (F8 Key)** | Switch between user text annotation overlays. |
| **Grab Last (F9 Key)** | Activate the last selected data for edit. |
| **Word Delete (F10 Key)** | Erase word associated with comment cursor. |
| | If you encounter a problem and cannot collect the logs immediately: |
| **Alt+1 or Alt+2** | Place a marker in the log. |
| **Alt+D** | Collect the logs. |
| | Once the logs are collected, the engineering team would be able to see the marker you added which will help engineering to troubleshoot the problem. |

## BT key arrangement

You can arrange the order of BT key on the control panel as you have programmed in the Utility page.

Figure 3-24. BT key

1. Assign the function to each key in Utility -> System -> User Configurable Key -> BT Key.

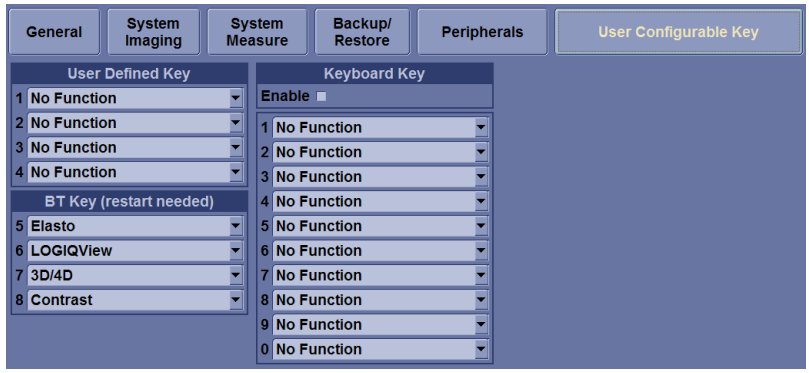



Figure 3-25. Utility page

## BT key arrangement (continued)

2. On the control panel, remove a key cap and put it in order of Utility screen. No.1 is left most key and No.5 is right most key.
   a. Stick the flat-blade screwdriver in the hole on the upper side of the key cap and bring up.

Figure 3-26. Remove the key cap

   b. Push the key cap until it clicks into the new position.
3. Restart the system to activate the new assignable.

CAUTION

Before cleaning the control panel, make sure the key cap is firmly in place.

## touch panel

The touch panel contains exam function and mode/function specific controls.

### Exam Function Controls

Figure 3-27. Exam Function Controls

1. Patient: Enters Patient screen
2. Scan: Enters scanning mode screen
3. Reports: Activates default report and touch panel of report choices.
4. End Exam: Activates Image Management and touch panel with end of exam options.
5. Utility: Activates system configuration menus.
6. Model: Selects the application to use.
7. Probe Indicator: Indicates and selects the probes.

*NOTE: Different menus are displayed depending on which touch panel is selected.*

At the bottom of the touch panel, there are five combination rotary dials/push buttons. The functionality of these rotaries changes, depending upon the currently-displayed menu. Press the button to switch between controls, or rotate the dial to adjust the value, or move the control left/right or up/down to adjust the value.

## Mode/Function Specific Controls

In general, the key name is indicated at the top of the key. There are different types of Touch Panel keys as illustrated below:

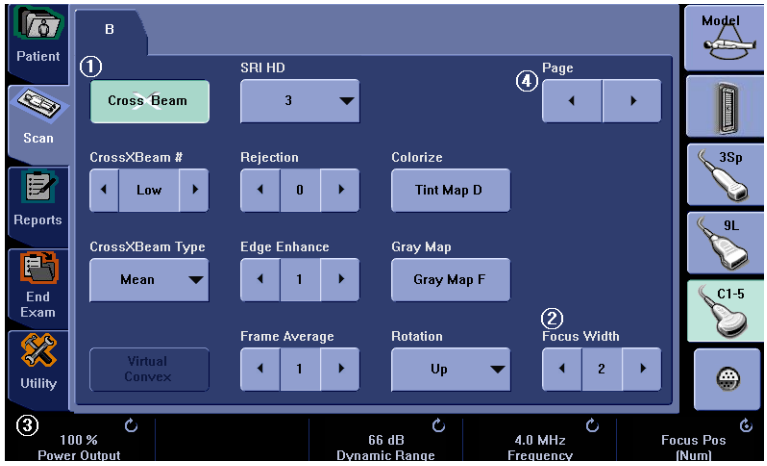



Figure 3-28. Mode/Function Specific Controls

1. Press to toggle control on/off.
2. Progress/Select keys are used for controls that have three or more choices.
3. Two-way functionality knobs (below the touch panel): Adjust controls by pressing (dot symbol), rotate (circled arrow symbol).
4. Press to move to the next touch panel page.

## Key descriptions

### Mode, Display and Record

This group of controls provides various functions relating to the display mode, display orientation, image recording/saving, freeze, gain and Cine scroll.

The Mode Controls select the desired display mode or combinations of display modes.

- During dual display modes the **L** and **R** keys activate the Left or Right displayed image. See ‘Split Screen’ on *page 6-4 for more information.*
- Auto is used to:
  - initiate auto optimize
  - turn off auto optimize.
- Steer/Depth/Width controls the image steer (left/right), image display depth (up/down) and image width (rotate).
- The Reverse key (via Depth key if preset) toggles the left/right orientation of the scan image.
- Print keys are used to activate/print the designated recording device.
- The Freeze key is used to stop the acquisition of ultrasound data and freeze the image in system memory. Pressing ***Freeze*** a second time continues live image data acquisition.
- To activate a specific mode, press the appropriate mode key.

  Each mode has its own gain control by turning the mode key.

## Measurement and Annotation

This group of controls performs various functions related to making measurements, annotating and adjusting the image information.

- The Comment key enables the image text editor and displays the annotation library touch panel.
- The Clear key is generally used to erase functions, such as annotations/comments, body patterns and measurements. Pressing the Clear key again exits the selected function.
- The Body Pattern/Ellipse control has a dual purpose:
  - Press the Body Pattern/Ellipse control, it enables the Body Pattern touch panel and displays the default pattern on the screen. When body patterns are active, the knob rotates the probe position indicator.
  - Rotate the Body Pattern/Ellipse control, it activates the ellipse measurement function after the first distance measurement has been set and the second caliper is activated.

    Press Set to fix the measurement after the ellipse adjustment is complete. The measurement is then displayed in the measurement result window.
- The Measure key is used in all types of basic measurements. When the Measure key is pressed, the measurement touch panel is displayed.
- The Set key is used for various functions, but is generally used to fix or finish an operation (e.g. to fix a measurement caliper).
- The Trackball is used with almost every key function in this group. Trackball control depends on the last key function pressed.

# LCD Monitor

## Related Hazards - LCD Monitor

- **DO NOT** place a finger, hand or any object on the joint of the monitor or monitor arm to avoid injury when moving the monitor and monitor arm.
- To avoid result of injury or system damage, **NEVER** place any object or liquid on the monitor, whether in the home or flip down/transport position.

  If an object or liquid falls/spills into the monitor or the cabinet, unplug the system immediately. Call a Service Representative for information.
- **DO NOT** scratch or press on the panel with any sharp objects, such as a pencil or pen, as this may result in damage to the panel.
- To avoid injury or damage, make sure nothing is within the range of motion before moving the monitor and monitor arm. This includes both objects and people.
- Before moving the system to another location, be sure to lock LCD/LCD arm in transport position.
- The LCD screen may have defective pixels. These pixels may appear as a slightly light or dark area on the screen. This is due to the characteristics of the panel itself, and not the product.
- The backlight of the LCD panel has a fixed life span. When the screen becomes dark or begins to flicker, contact a qualified Service Representative for information.

*NOTE: Bright light could impact readability of screen.*

## Moving the LCD monitor

The LCD monitor moves in the range of below.

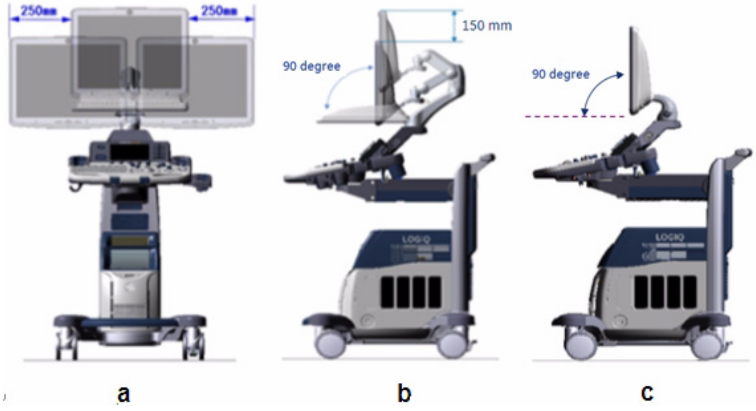



Figure 3-29. Monitor moving range

a, b LOGIQ S7 Expert c LOGIQ S7

### Adjusting the LCD Monitor Position

Grab the bottom of the LCD monitor when you adjust the position of the monitor and monitor arm.

Figure 3-30. Positioning the LCD monitor

## Locking/unlocking the monitor

1. Turn the release knob counter clockwise to unlock the LCD monitor. The LCD monitor can be moved freely in all directions (Figure 3-31 1).
2. Turn the release knob clockwise to raise the lock and move the LCD monitor into the parked position (Figure 3-31 2).

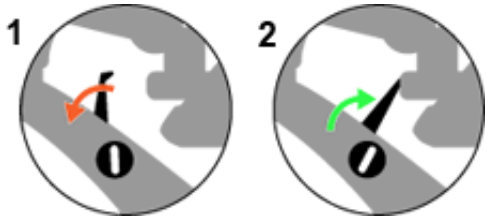



Figure 3-31. Lock/Unlock the monitor arm

1. Unlocked LCD monitor
2. Locked LCD monitor

# Monitor Display

## Monitor Display

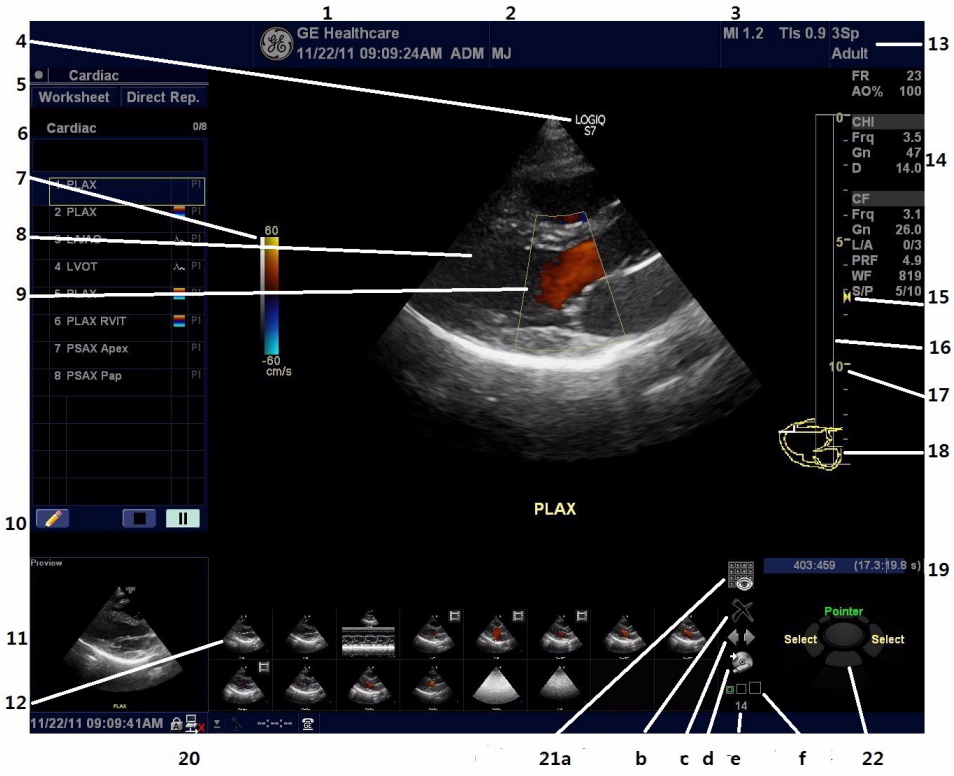



Figure 3-32. Monitor Display Tour

## Monitor Display (continued)

1. Institution/Hospital Name, Date, Time, Operator Identification.
2. Patient Name, Patient Identification.
3. Power Output Readout.
4. Probe Orientation Marker.
5. Worksheet/Direct Report.
6. Measurement Summary Window.
7. Gray/Color Bar.
8. Image.
9. Color Doppler ROI box.
10. Scan Assistant Icons.
11. Image Preview.
12. Image Clipboard.
13. Probe Identifier. Exam Preset.
14. Imaging Parameters by Mode.
15. Focal Zone Indicator.
16. TGC.
17. Depth Scale.
18. Body Pattern.
19. Cine Gauge
20. Current date and time, Caps Lock: (lit when on), network connection indicator (PC=connected, PC with X=not connected), DVR status, system messages display, InSite status, InSite controls.
21. Image Management Icons:
    a. Active Images screen
    b. Delete Image
    c. Next/Previous Image(s); and Clipboard Slide Show if you press and hold down the [Ctrl] key + Next or Previous Arrow
    d. Save As Menu
    e. Thumbnail Size
    f. Number of Images in Exam.
22. Trackball Functionality Status.

## Trackball Key Map

The current mapping is shown on the trackball mapping display area in the lower, right-hand corner of the display screen. Six Trackball keys surround the Trackball. These Trackball keys are mapped based on the current state of the system (live imaging, frozen imaging, measurements, etc.)

Trackball functionality is labeled on the display. To activate new functionality for the Trackball, press the correct key adjacent to the Trackball, as indicated on the display.

If there are more than 2 functions assigned to a single key, the selected function is highlighted.

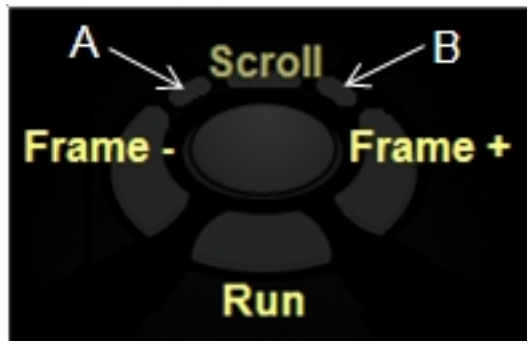



Figure 3-33. Example: Trackball Functionality for Cine

Table 3-5: Trackball keys (A and B)

| | Keys A and B | |
|---|---|---|
| **Imaging Mode** | **Symbols** | **Function** |
| Live B, B-Flow, B-Flow Color | | Focal Zone Down/ Up |
| CF, TVI, B-Flow Color | | Box Steer |
| PW, CW, TVD | | Baseline Down/Up |
| Mode Cursor | | Sample Volume Size |

## Using the Monitor Display Controls to Manage Images

You can manage images from the display via these on-display controls.

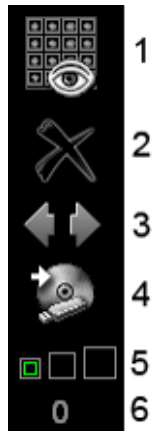



Figure 3-34. Menu Icons

1. Active Images Screen
2. Delete Image
3. Next/Previous Image(s); and Clipboard Slide Show if you press and hold down the [Ctrl] key + Next or Previous Arrow..
4. Save As Menu
5. Thumbnail Size
6. Number of Images in Exam

### Active Images Page

Press Active Images Page to go to the Patient Active Images page.

### Delete

You can use this to delete an image from the clipboard.

1. Place the cursor on the clipboard image you want to delete, then press **Set** to select the image.
2. Place the cursor on the Delete icon and press **Set**.

### Next Clipboard Image

Press the left arrow to move to the previous image; press the right arrow to move to the next image.

### Clipboard Slide Show

The Clipboard Slide Show plays all images on the clipboard and wraps around the ends. To activate, press and hold [Ctrl] + [Previous Arrow] or [Ctrl] + [Next Arrow].

- Each image recalls for three seconds, or the length of the loop, whichever is longer.
- You can manually skip to a new image during the slide show by recalling it, as usual.
- To end the slide show manually, press [Ctrl] + [Previous]/ [Next] again.
- Slide Show ends when you go to live scanning, or if the clipboard is not shown when it's time for the next image to load.

### Save As menu

Activate Save As feature. See 'Save As' on *page 15-11 for more information.*

### Thumbnail Size

Place the cursor on one of the Thumbnail size box icons and press **Set**.

### Number of Images in Exam

The number of images in an exam is tracked on the bottom of these Monitor Display Controls.

# *Chapter 4*

# Preparing for an Exam

*Describes how to begin an exam.*

# Beginning an Exam

## Introduction

Begin an exam by entering new patient information.

The operator should enter as much information as possible, such as:

1. Dataflow
2. Exam category
3. Patient ID
4. Patient name
5. Exam Information

The patient's name and ID number is retained with each patient's image and transferred with each image during archiving or hard copy printing.

CAUTION

To avoid patient identification errors, always verify the identification with the patient. Make sure the correct patient identification appears on all screens and hard copy prints.

## Beginning a New Patient

Pressing the ***Patient*** touch panel key displays the Patient Screen on the monitor.

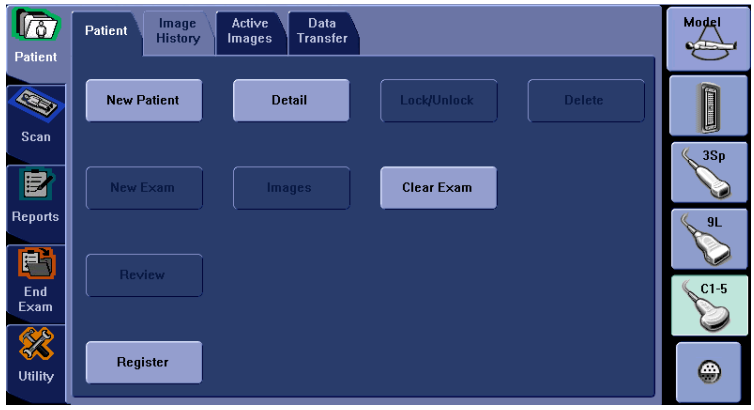



Figure 4-1. Patient touch panel

New Patient should be selected at the beginning of each new patient exam. End Exam should be pressed at the end of each exam. Pressing **New Patient** automatically stores all patient data, annotations, measurements, calculations and worksheets of the last exam. Images are not automatically stored. A warning message appears regarding images being erased or saved. It is always best to select “Store All” if you are unsure of saving. Exams and patients can always be erased later.

*NOTE: If the current patient does not exist, selecting the **Patient View** tab activates the Patient Search screen.*

*NOTE: If the current patient exists, selecting **Exam View** activates the Exam History screen.*

## Patient Screen

Figure 4-2. Patient Screen (Example: Category OB)

1. Image Management
2. Function Selection
3. EZBackup/EZMove
4. Dataflow Selection
5. Exit
6. Patient Information
7. Category Selection
8. Exam Information
9. Patient View
10. Scan Assistant Program

## Patient Screen (continued)

Enter Patient Data with the alphanumeric keyboard.

To navigate through the Patient Entry menu, use the ***Tab*** key or **Trackball** and **Set** to move and fix the cursor.

**Image Management**

- Patient–Provides a search and creation of patient. (currently selected)
- Image History–Provides a list of images per exam for the currently selected patient.
- Active Images–Provides preview of the currently selected exam.
- Data Transfer–Provides an interface to handle patient data from a remote device.

## Patient Screen (continued)

### Function Selection

- New Patient–Used to clear patient entry screen in order to input a new patient's data into the database.
- Register–Used to enter new patient information into the database prior to the exam.

*NOTE: If you are using the auto-generate Patient ID feature, do not select Register.*

*NOTE: It is always a good practice to Register all patients.*

- Details–Select the Detail box to activate/deactivate the exam details. Exam details include Indications, Comments, Admission Number, Performing Physician's Telephone Number, Referring Physician's Telephone Number, Operator Telephone Number and Exam Description.

*NOTE: Select preset at Exam Description to use as the identifier in DICOM.*

Figure 4-3. Detail Window

## Patient Screen (continued)

### EZBackup/EZMove

One-step method to backup (move and delete patient images) to an external media.

### Dataflow Selection

Select the appropriate dataflow.

*NOTE: If you use a DVD-R, select DICOM CD Read in Dataflow.*

If you place the cursor on the icon, the pop-up menu displays disk capacity.

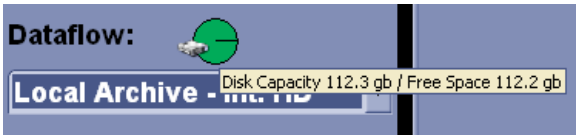



Figure 4-4. Dataflow Pop-up

### Exit

Used to exit Patient Menu.

## Patient Screen (continued)

### Patient Information

- Patient ID Number
- Other ID

  The Other ID is used to add additional information of the patient, such as Citizen ID.

*NOTE:* *To enable/disable the Other ID field, go to Utility --> Connectivity --> Miscellaneous.*

*NOTE:* *To select Other ID format, go to Utility --> Connectivity --> Miscellaneous.*

- Patient Name–Last, First and Middle
- DOB (Birthdate)
- Age (automatically calculated when birthdate is input)
- Sex

### Category Selection

Select from 8 exam application categories: Abdomen, Obstetrics, Gynecology, Cardiology, Vascular, Urology, Small Parts or Pediatrics.

When a category is selected, the measurement and category presets are displayed.

## Patient Screen (continued)

### Exam Information

Shows the Current/Active Exam information. Information pertinent to the selected exam category appears in the window. All possible information needs to be entered.

- Images–Displays the selected exam's images.

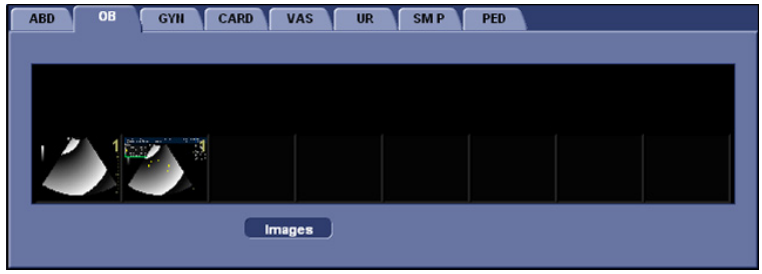



Figure 4-5. Images

- Clear–Clears existing data.
- Past Exam (only for OB)–Input past exam data (register the patient before using).

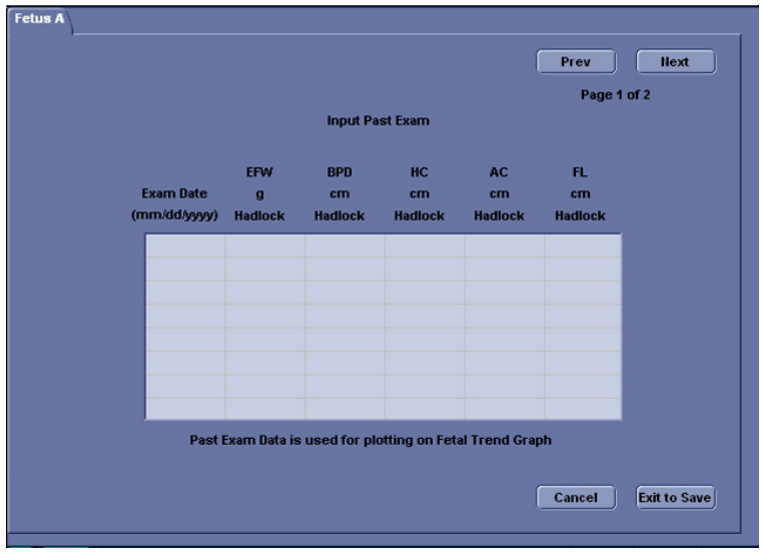



Figure 4-6. Input Past Exam

## Patient Screen (continued)

### Patient View

Lists the patients in the database.

*NOTE: When you double-click the patient on the patient list with the **Set** key, the Review screen or New Exam entry screen displays. Select Review or New Exam in Utility -> Connectivity -> Miscellaneous -> Double click on patient list to start preset.*

- Search key–select search item from Patient ID, Last Name, First Name, Birthdate, Sex, Exam Date, Exam Today, Accesstion Number, Exam Description, Exam Date Before, Exam Date Between, Exam Date After, Locked (Y, N) or Img. Archived (Y, N).

*NOTE: If "Exam Date Between" is selected, the Input Dialog displays and you can select the date from the displayed calender.*

*NOTE: Img. Archived means that the exam was backed up to external media by EZBackup or Export.*

- String–enter appropriate information.

  If you select Locked (Y, N) or Archived (Y, N) for the Search key, enter Y (Yes) or N (No).

*NOTE: If "Exam Date Between" is used for the Search key, the From and To dates are separated by a "-" (dash) in the Search String.*

- Clear–Clears the entered string.
- Listing XX of XXX -- Displays the quantity of patients in the search window and the quantity of patients in the database.
- Review–Select Patient/Exam for review.
- Resume Exam–Continues the exam for that patient if you select the last exam of the day.
- New Exam–Creates a new exam on a current patient.
- Delete–Deletes Patient/Exam.

*NOTE: "Delete" is only displayed when you login as Administrator.*

**Patient View (continued)**

- Lock/Unlock–Locks the exam/patient. Prevents move and delete functions.

  To lock, select the exam or patient to be locked and select ***Lock***.

  If you select the patient, all exams are locked. If you select one exam, the selected exam is locked and the lock icon displays in the patient ID cell.

  To unlock, select the locked exam or patient and select ***Unlock***.

- Exam View–Displays the Exam History of the selected patient.

  Disk - Displays the disk name on which you saved the exam's image data. If "+" displays behind the disk name, the data is saved on two or more disks.

  See 'Review images in archive' on *page 4-28 for more information.*

*NOTE: The system can display the Detail Mode instead of Exam View when you select the patient on the patient list and press Review or Register. If the Detail Mode preset on Utility -> Connectivity -> Miscellaneous menu is selected, the Detail Mode displays.*

**Scan Assistant Program**

The Scan Assistant Program is either selected automatically or manually, depending on the preset as configured on the Utility--> System--> General page.

## Patient Screen (continued)

CAUTION

To maintain optimum performance and to safeguard patient data, keep the total number of patients in the database below 1,000.

To reduce the total number of patients in the database, perform the following procedure.

1. Before starting EZBackup, select “Unlock All” on the Utility -> Admin -> Logon screen.

   Prepare the unformatted CD-R or DVD-R before EZBackup.

*NOTE: Formatted CD-R or DVD-R cannot be used for EZBackup.*

2. First perform EZBackup and then Backup (Patient Archive and Report Archive).
3. Go to the patient screen, select the patients/exams to delete. Select “Delete” to delete the selected data.

*NOTE: Removing image data with the “EZMove” function does not reduce the patient number in the database.*

*NOTE: Ensure that all patients are exported or backed up BEFORE deleting them.*

We recommend attaching the patient list to the EZBackup media. Insert the media and select DICOM CD Read for dataflow (if you use a USB drive, select DICOM USB Drive I Read). Select any patient and press the programmable Set key to print the patient list on the digital printer or PC printer.

## Printing the Patient List

You can print the patient list on a connected printer.

1. Move the cursor to the patient list and select any patient.
2. Press the left **Set** key. The pop-up menu displays.

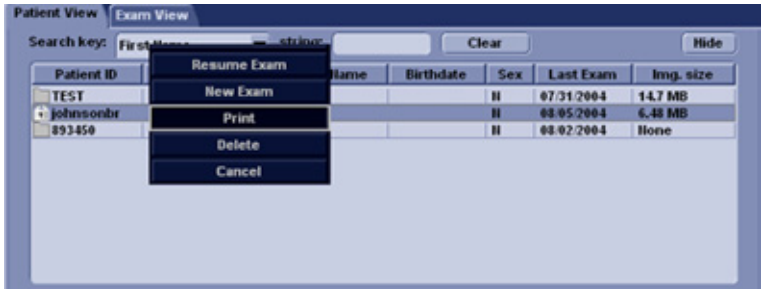



Figure 4-7. Print the patient list

3. Select ***Print*** and press **Set**.

## Scanning a New Patient

Imaging functions may be lost without warning. Develop emergency procedures to prepare for such an occurrence.

Ensure you have selected a dataflow. If No Archive is selected, no patient data is saved. A Ø appears next to Dataflow if No Archive is selected.

To avoid patient identification errors, always verify the identification with the patient. Make sure the correct patient identification appears on all screens and hard copy prints.

Always use the minimum power required to obtain acceptable images in accordance with applicable guidelines and policies.

Always use the system on a flat surface in the patient environment.

Ensure that the hands of the patient are away from the system during the exam.

The position of the operator and the patient vary by scan region.

In most case, the operator sits/stands straight in front of the operator console and the patient lies on the bed on the right (or left) side of the system.

## Scanning a New Patient (continued)

When starting a new patient's exam, ensure you do the following:

1. Press **Patient**.
2. Press ***New Patient*** on the Patient menu.
3. If there are images on the clipboard, a pop-up menu appears. Specify whether you want to store images permanently, delete images, or go to active images.
4. Choose the exam category.
5. Verify the dataflow.

*NOTE: DO NOT use the removable media Dataflows on the New Patient menu.*

*NOTE: The system can display a warning dialog when the patient is registered to "No Archive". If the "Warn register to No Archive" preset is selected in the Utility -> Connectivity -> Miscellaneous menu, a warning displays. A different dataflow for permanent storage of patient data should be selected.*

6. Fill in patient information.

*NOTE: You can also select a patient from the patient database at the bottom of the Patient menu if the patient has a patient ID.*

Columns drive the ordering of the patients displayed. The column that you select drives the order of the displayed patient database.

7. Select ***Register***. Enter Past OB Exam information, if desired.
8. Select the probe to start scanning (or select Exit, Esc, Scan, or Freeze).
9. Perform the exam.

## Scanning a New Patient (continued)

10. Store the raw data to the clipboard.

    To store the still image, press **Freeze** and run the cineloop using the **Trackball**. Select the frame and press **P1** (or the assigned Printer key).

    To store the cineloop, press **Freeze** and run the cineloop using the **Trackball**. Select the start/end frame and run the selected loop. Press **P1** (or the assigned Print key).

11. When you have completed the study, press ***End Exam***. The image management screen displays. Select the images (still frame or cineloop) you want to store or select ***Select All*** to store all images. Select ***Permanent Store*** to store the images permanently.

CAUTION

After completing the measurement, verify that the measurement result window is updated before you send or save the image.

*NOTE: Return to the patient screen automatically from the scan screen when you select OK from the "ID is not unique" warning message.*

### Starting a new exam on an existing patient

1. Press **Patient**.
2. Select the patient from the Patient List.
3. Select ***New Exam***.
4. A new exam is created. Enter the data and begin the scan.

### Ending a Patient Exam

When you have completed the study, press ***End Exam***, End Current Patient or New Patient, then Store All Images Permanently.

### Entering Patient data

All patient information can be entered before starting an exam.

1. Press **Patient** to display Patient Screen.
2. Press ***New Patient*** to erase the current patient data.
3. Enter the Patient ID.
4. Enter the patient and exam information.
5. Press ***Register***.
6. Repeat above steps as required.

Select the patient from the Patient List and select ***Resume Exam*** to start an exam.

## Scanning without entering any patient data

To scan a patient without entering any patient data until the end of the exam:

1. Press ***Scan***.
2. Scan the patient and save images to clipboard without patient. You receive a warning that states “A patient must be selected for permanent storage of image.” Press OK.
3. Press **Patient** to display the Patient Search screen.
4. Enter the Patient ID.

*NOTE: If you have images or measurements that are not attached to a Patient ID, the message “Unsaved images, measurements or fetus number will be linked to the current patient information , continue?” appears when the patient ID is registered.*

5. Enter patient data and exam information as necessary.
6. Press ***Active Images***.
7. Press ***Permanent Store***.

## Retrieving and editing archived information

### Searching for an existing patient

1. Press ***Patient*** to display the Patient Screen.
2. Select the search key. Enter the search string.

NOTE: *When the number of patients on a hard disk is in the hundreds, it takes time to search for a patient or switch to another screen. In this case, do one of the following:*

- *Uncheck the Auto Search function at the Utility -> Connectivity -> Miscellaneous screen.*
- *Delete unnecessary patient data.*

3. An appropriate patient is displayed.

Figure 4-8. Patient Search Screen

a. Select ***Review*** to review the exam history of this patient.

   If you select the patient of the day, Resume Exam in place of Review displays to continue the exam.

b. Select ***New Exam*** to create a new exam for this patient.

c. Select ***Delete*** to delete this patient.

d. Lock. See ‘Patient View’ on *page 4-10 for more information.*

NOTE: *“Delete” is only displayed when you login as Administrator.*

## Pop-up menu

If you select the patient and press the left **Set** key, the pop-up menu displays.

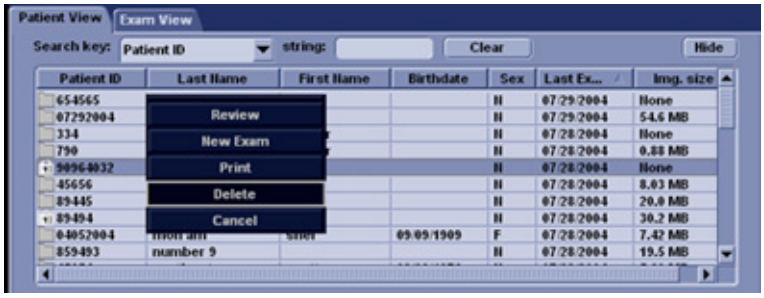



Figure 4-9. Archived Patient

If you select the patient of the day, ***Resume Exam*** displays to continue the exam.

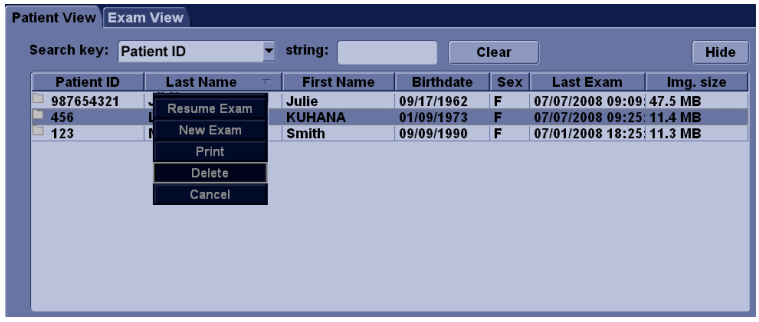



Figure 4-10. Patient of the Day

*NOTE: The preset "Double click on patient list to start", located on the Utility -> Connectivity -> Miscellaneous screen, allows you to display either the Review or New Exam screen by double clicking the **Set** key on the patient name.*

## Edit and Copy Patient

"Edit and Copy Patient" function would do:

- Copy data of a registered patient from the local archive to a new created patient in the local archive. The new created patient would have new identification: patient ID, other ID, patient name, and sex etc.
- The copied exam data also has new identification: new UIDs. The new-copied patient would have same medical data with patient being copied but different identification.
- The user can then select to delete the old patient.

*NOTE: "Edit and Copy Patient" should only copy patient data, images inside the local archive, it will not deal with patient data, images outside local archive. That includes images EZMoved, exported, MPEGgvued, SaveAsed, DICOM Stored, (DICOM) printed.*

*NOTE: EZMoved image link should be removed from the database for copied patient.*

*NOTE: "Edit and Copy Patient" should not copy report. Report link should be removed from the database for copied patient.*

*NOTE: "Edit and Copy Patient" should not deal with patient information already burned in image pixels.*

*NOTE: The image with title bar that have patient information should be copied as is.*

*NOTE: "Edit & Copy" function is not displayed when there is current patient.*

*NOTE: "Edit & Copy" function is not displayed when multiple patients are selected.*

CAUTION

The user is responsible for patient data, diagnostic information or any other patient related information entered in the database.

## Edit and Copy Patient (continued)

1. Select a patient in the patient list and right click to popup a menu with “Edit & Copy” selection.

*NOTE: “Edit & Copy” function is only displayed when you login as Administrator.*

*NOTE: Select dataflow with Local Archive.*

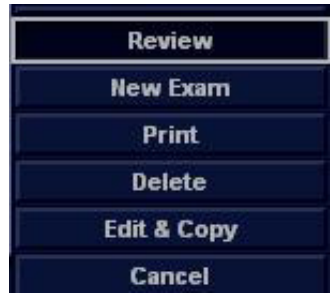



Figure 4-11. Pop-up menu

2. A confirmation dialog displays. Select ***OK***.

*NOTE: If the selected patient has reports or images were EZMoved, the warning message “The copied patient will not have any reports or links to EZMoved images” displays.*

## Edit and Copy Patient (continued)

3. A Edit & Copy dialog displays. All the fields should inherit values from the original patients except Patient ID and Other ID.

Figure 4-12. Edit and Copy Dialogue

- ***Generate Patient ID*** button to help to generate a patient ID.
- ***Delete original after copy*** checkbox to indicate if the system should delete the original patient after “Edit and Copy Patient”.
- ***Clear All*** button to clear all fields except Patient ID and Other ID.
- ***Cancel*** button to cancel “Edit and Copy Patient” function.

4. Enter the new Patient ID.

   If the new entered Patient ID is not unique in the database, Patient ID turns to red and error message displays on the status bar.

## Edit and Copy Patient (continued)

5. Check ***Delete original after copy*** as necessary.

*NOTE: DO NOT check the check box if you want delete patient data afterwards in the Patient View.*

6. Press ***Copy***. An indicator displays to indicate the process is proceeding.

   If the user press ***Copy*** with original Patient ID, an error dialogue displays.

   If the user press ***Copy*** with blank Patient ID, a warning dialogue displays.

7. When the copy is done, the patient list is refreshed.

   If failed, a dialog displays to inform.

8. The user checked the “Delete original after copy” checkbox, a confirm dialog is popped with original patient ID and name to ask the user wants to delete the original patient.

   Press ***OK*** to continue.

*NOTE: If the patient is locked, the patient should not be deleted and a dialog should be displayed.*

## Changing Patient Information or an Exam

CAUTION

The user is responsible for patient data, diagnostic information or any other patient related information entered in the database.

If patient information needs to be edited, pressing ***Patient*** enables the Patient Screen for modifying information.

If the patient is still active, you can go to the New Patient page and choose the tab that is desired. The exam changes in the Exam View area.

If the exam category needs to be changed, pressing ***New Exam*** allows modification of the Patient Screen without erasing accumulated patient images, measurements, annotations, calculations and worksheets.

1. Display the Patient screen by pressing ***Patient***.
2. Select patient from the Patient list. The system automatically searches to see if the patient is already in the database.
   - Select Search key (Patient Data: ID, First Name, Last Name, Birthdate, Sex or Exam Date.
   - Enter search string (for example, initial letter of Patient Name)
3. The appropriate patient is displayed.

   If patient information needs to be edited or the exam category changed, use the New Exam feature. Pressing ***New Exam*** allows modification of the Patient Screen without erasing accumulated patient images, measurements, annotations, calculations and worksheets.
4. To have the database shown in its entirety, ***Backspace*** on the Search string and all patient names appear.
5. Select Register to register the new exam.

   A new exam is automatically created on that patient unless an exam already exists on that day for that patient.
6. To display the patient information on the title bar, press the ***Esc*** key, the **B-Mode** key or ***Register***.

   Select the Model and appropriate probe touch panel keys, if necessary.

## Deleting the existing patient/exam/image

CAUTION

Before deleting a patient or image from the Patient Screen, make sure you have already saved the data with EZBackup/ EZMove or Export. Verify the media before deletion.

### Deleting the existing patient

1. Search and select the patient in the patient list with the **Ctrl** or **Shift** keys.
2. Select ***Delete***. The confirmation dialog box displays.

   OR

   Press the left **Set** key. A pop-up menu displays. Select ***Delete***. The confirmation dialog box displays.

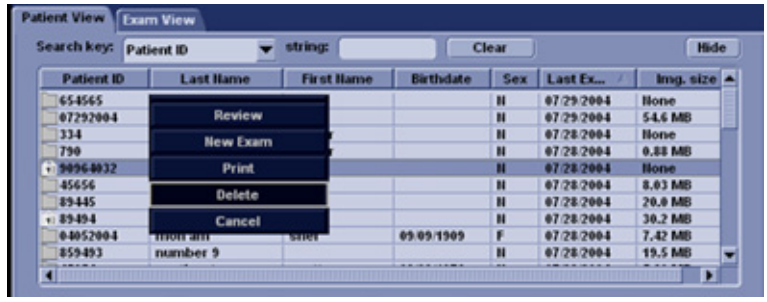



Figure 4-13. Select the patient in the patient list

3. Select OK to delete or Cancel.

## Deleting the existing patient/exam/image (continued)

### Delete multiple patients from the patient list

1. Select the multiple patients to be deleted from the patient list.
2. Select ***Delete***. The confirmation dialog box displays.

   OR

   Press the left **Set** key. A pop-up menu displays. Select ***Delete***. The confirmation dialog box displays.

Figure 4-14. Select deleted patients in the patient list

3. Select **OK** to delete or **Cancel**.

### Deleting the existing exam

1. Search and select the patient in the patient list.
2. Select ***Review***.
3. The patient exam screen displays. Select the exam to be deleted.
4. Select ***Delete***. The confirmation dialog box displays.
5. Select OK to delete or Cancel.

### Deleting the existing image

1. Search and select the patient in the patient list.
2. Select ***Review***. The patient exam screen displays.
3. Select the exam which contains the image to be deleted.
4. Select ***Active Images*** to display the image list.
5. Select the image to delete and select ***Delete***. The confirmation dialog box displays.
6. Select **Yes** to delete or **No** to cancel.

## Review images in archive

There are two ways to access to archived images:

- Review the images from a selected examination.
- Select images from the Active Image screen displaying all the images sorted by examination for the actual patient record.

### Review the patient exam/image

To review the patient exam,

1. Move the cursor to the patient in the Patient View and double-click. Exam View displays.

   or

   Move the cursor to the patient and select Exam View tab or ***Review***. Exam View Displays.
2. Move the cursor to the desired exam and double-click.
3. Active Images screen displays. Move the cursor to the image and double click or press ***Review***.
4. The review screen displays. Select the image from clipboard.

*NOTE:* *See ‘Clipboard’ on page 15-9 for more information.*

### Active Images

Active Images displays the images of the exam.

*NOTE: CINE loops are not played interactively as you view the active images on the Patient screen.*

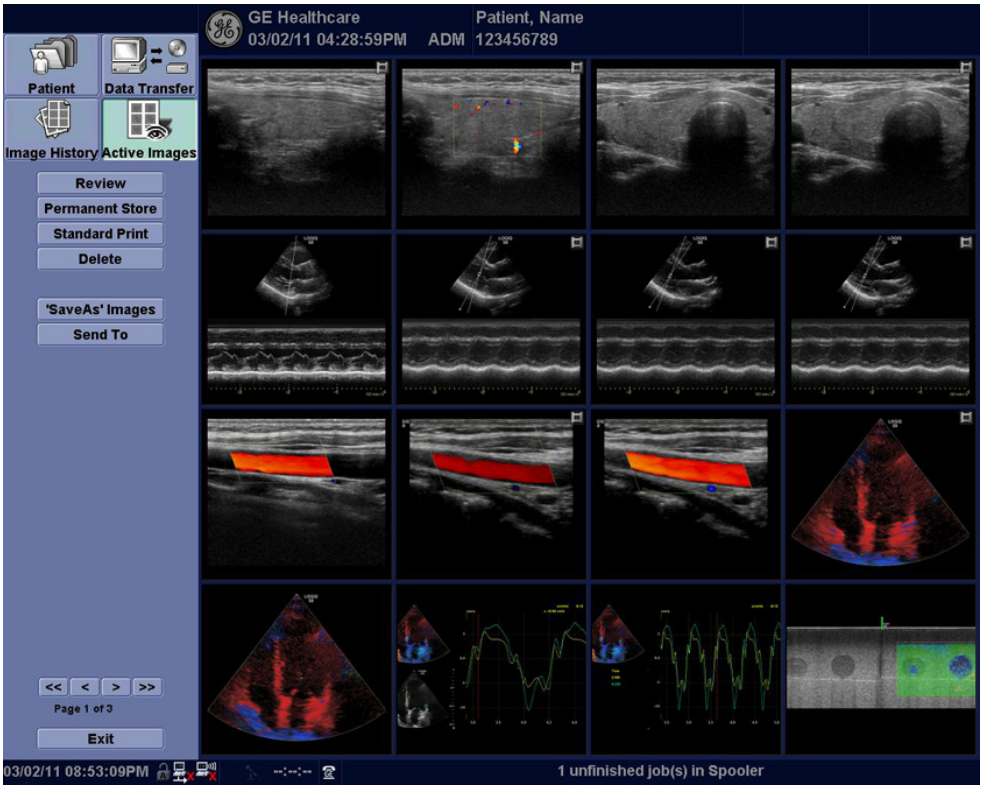



Figure 4-15. Active Images Screen

1. Select the exam which includes the image to review.
2. Select ***Active Images***.
3. Select the image and press ***Review*** or double click on the image. The image is displayed.

   If you select 2 - 4 images and select ***Review***, the archived images are displayed in the split screen.

*NOTE: If the size of an image is larger than 2GB, the image does not display on the Active Image screen. Take care when you scan a long CINE Loop, such as in Contrast.*

**Active Images (continued)**

Table 4-1: Active Images

| Parameters | Description |
|---|---|
| Delete Images<br><br>Delete Selected Images/Delete All Temp. Images | To delete selected images, select the image in the active screen, then select ***"Delete"*** on the monitor display or ***"Delete Selected Images"*** on the touch panel.<br><br>To delete all images, select the image, then select ***"Delete All Temp. Images"*** on the touch panel. |
| Permanent Store | Select the images which you want save to the Local hard disk drive. |
| Standard Print | To print an image,<br><br>1. Select the image you want to print from the Active Images screen. You can print one (1) image per sheet or 2x3 images per sheet.<br>2. Press ***Standard Print***.<br><br>NOTE: If the printer is not assigned to the button, you will get a message telling you to Check Printer Button Configuration.<br><br>NOTE: There is no warning to let you know that the printer is not functioning. Check the printer.<br><br>You need to configure the printer to the Standard Print button via ***Utility*** --> ***Connectivity*** --> ***Button***. |
| SaveAs Images | Refer to ''SaveAs' Images' on *page 15-16* for the detail.<br><br>You can select the multiple images collectively in Active Image screen which you want save by SaveAs.<br><br>NOTE: We suggest that you save the images page by page with 'SaveAs' Images in Active Images. It takes time if you have many images or raw data. |
| Select Images/Select All<br><br>Unselect All | • To select one or multiple image, place the cursor on the image and press Set.<br>• To select all images, press Select all on the touch panel.<br>• To deselect images, press Deselect all on the touch panel. |
| Send To | Refer to 'Send To (Send the image to the DICOM Device)' on *page 15-36* for the detail.<br><br>Note: "Send To" button is not displayed in Active Images menu and the touch panel if the patient is not selected. |

### Analyzing Images

To analyze the archived images, select the image, then select ***Review***. The archived images is displayed with the date and time of archival.

To compare the analyzed image to a live image, press **L/R**. Now both the archived and live images appear on the monitor display. Unfreeze the live image area.

## Image History

Image History displays the images of each exam in chronological order of the patient.

1. Select the patient.
2. Select ***Image History***.
3. Select the appropriate button which shows the old exam by date and storage location. ‘Active Exam’ is displayed on the button.

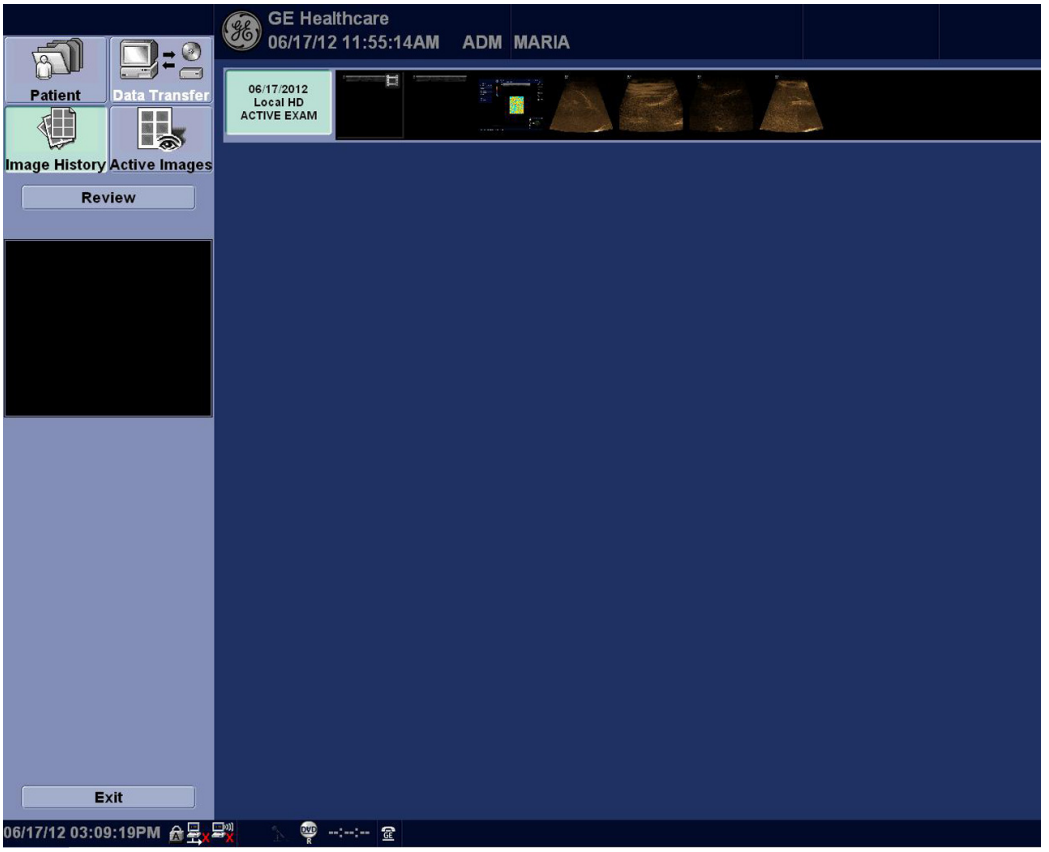



Figure 4-16. Image History Screen

4. Move the cursor to the required image for review.
5. Select ***Review***. The selected image (maximum of 4 images) is displayed.

## Image History (continued)

If the image data is saved on a disk and you do not insert the disk when displaying the Image History page, a triangle icon displays instead of a thumbnail.

Place the cursor on the icon. The disk name displays under the preview window. Insert the appropriate disk.

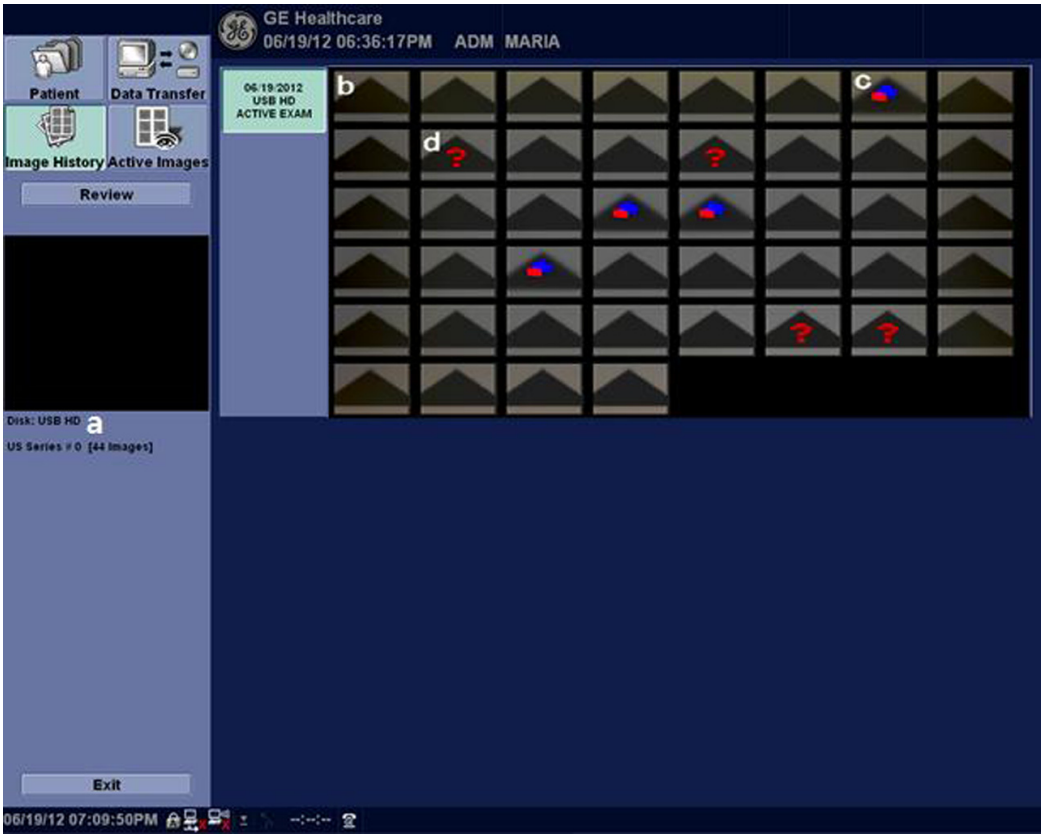



Figure 4-17. Image History (without disk in drive)

a. Name of the disk displayed under the preview window
b. Raw data B-Mode image
c. Raw data Color image
d. Image which does not have raw data (screen capture image)

## Image History (continued)

### Viewing two different studies from the same patient

To view images side-by-side from two different studies on the same patient,

1. Select the patient.
2. Go to the Image History page.
3. Select the first image.
4. Select the next image from the other exam.
5. Press ***Review***.

## Selecting an Application Preset and a probe

### Selecting an Application Preset

The exam category preset that best describes the desired exam to be performed is chosen after the exam category is selected. The factory default preset selections are displayed on the touch panel.

Use these parameters as a starting point for the exam.

### User-Defined Application Presets

There are four user-defined application presets that can be set on the system.

To set up User-Defined Application Presets,

1. From the touch panel, select the ***Model*** icon at the top of the touch panel. The Model touch panel appears:

Figure 4-18. Model touch panel

## User-Defined Application Presets (continued)

2. Press ***Save***. A pop-up menu appears: The Create New Application menu appears.

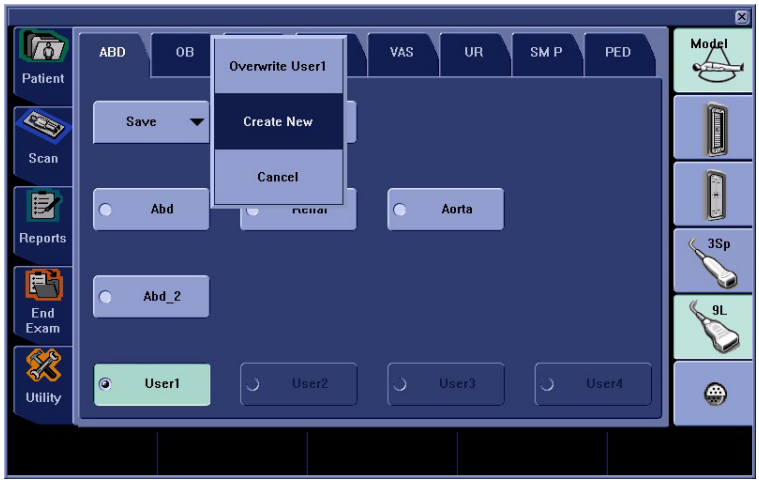



Figure 4-19. Create New User Pop-up Menu

3. Select ***Create New***. The Create New Application menu appears.

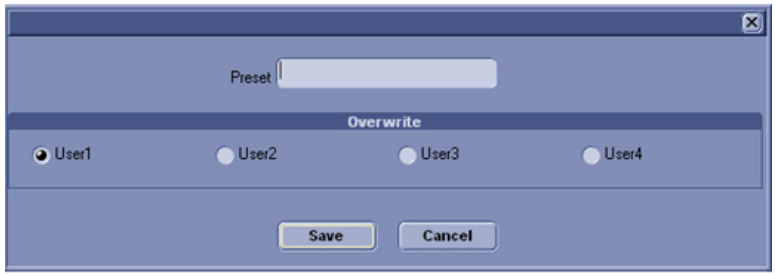



Figure 4-20. Create New User Application Menu

*NOTE: The new user application is based upon the current exam category and application, plus any modifications you have made, including the comment library and M&A calcs.*

## User-Defined Application Presets (continued)

4. Type the name of the new application. Specify which User touch panel key you want to use and press ***Save***.

*NOTE: The name of the new application cannot include spaces or symbols. However, the name can include numbers and letters.*

The new application now appears on the touch panel.

Figure 4-21. New User Model

*NOTE: You can set up to four (4) user-defined application presets for each exam category.*

## User-Defined Application Presets (continued)

5. To view/edit the parameters for the user-defined preset, press Utility --> Imaging.

   If you change the settings for this application, make sure to save the changes via Save --> Overwrite (user application).

*NOTE: If you select Reload Factory Defaults for the User-Defined application that you created, the settings for this user-defined application revert back to the factory settings for the exam category and application it was based upon.*

*NOTE: If you use the user-defined preset as the default preset, re-select the preset in Utility whenever you overwrite the user-defined preset.*

*NOTE: You cannot delete a user-defined application; it still appears after you have `deleted' it. However, you can change it by overwriting the user-defined application you want to delete with a new one.*

## Selecting a probe

Select the appropriate probe from the probe indicator. Probes can be used in more than one exam category/application.

- Always start out with a probe that provides optimum focal depths and penetration for the patient size and exam.
- Begin the scan session using the default Power Output setting for the probe and exam.

Figure 4-22. Probe Indicators (Example)

1. Probe Indicators

# *Chapter 5*

# Optimizing the Image

*Describes how to adjust the image. This chapter is broken into the following sections: B-Mode, M-Mode, Color Flow Mode, M Color Flow, Doppler Mode, Contrast Enhanced Ultrasound, Elastography, and 3D Mode.*

# Optimizing B-Mode

## Intended Uses

B-Mode is intended to provide two-dimensional images and measurement capabilities concerning the anatomical structure of soft tissue.

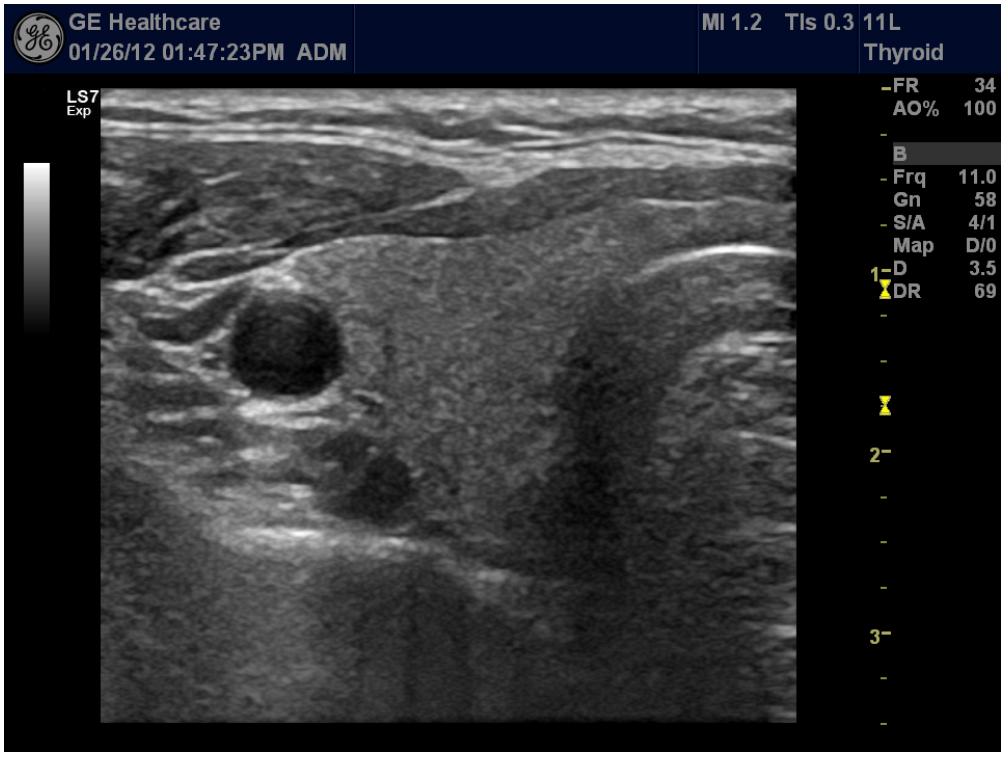



Figure 5-1. B-Mode Display -- Representative Example

## Typical B-Mode Exam Protocol

A typical examination using B-Mode might proceed

1. Record exam-related patient information. Verify system setup (probes and presets).
2. Position the patient and the console for optimum operator and patient comfort. Perform the scan.
3. Complete the study by collecting all the data.

Ensure that the hands of the patient are away from the system during the exam.

The position of the operator and the patient vary by scan region.

In most cases, the operator sits/stands straight in front of the operator console and the patient lies on the bed on the right (or left) side of the system.

Always use the minimum power required to obtain acceptable images in accordance with applicable guidelines and policies.

## B-Mode Scanning Hints

HINTS

These B-Mode controls produce the following results:

**Auto Optimize**. Automatically improves the contrast resolution of the image by changing the gray scale to match the image data. Available in B-Mode and Doppler Mode.

**Coded Harmonics**. Enhances near field resolution for improved small parts imaging as well as far field penetration.

**B-Flow**. Provides a more intuitive representation of non-quantitative hemodynamics in vascular structures.

***Frequency***. Changes system parameters to best optimize for a particular patient type.

***Gray Map***. Affects the presentation of B-Mode information. Choose the gray map prior to making other adjustments. There is an interdependency between gray maps, gain, and dynamic range. If you change a map, revisit gain and dynamic range settings.

**Dynamic Range**. Changes the amount of gray scale information displayed. A higher dynamic range shows more gray scale information displayed, while a lower dynamic range displays less gray scale information onto the same display scale. If you increase the gain, you may want to decrease the Dynamic Range.

***Frame Average***. Smooths the image by averaging frames. Affects the amount of speckle reduction.

**TGC**. Adjust TGC to adjust Gain in specific areas.

**Focal Zones**. Focal zones should be placed roughly in the lower half of the display depth, at or below the organ of interest.

**Width**. Sizes region of interest. Adjust the Width to the smallest reasonable size to maximize frame rate.

## Depth

**Description**

Depth controls the distance over which the B-Mode images anatomy. To visualize deeper structures, increase the depth. If there is a large part of the display which is unused at the bottom, decrease the depth.

**Adjusting**

Each adjustment cycles you to the next Depth setting. Imaging and display parameters adjust automatically.

To increase/decrease, adjust **Depth**.

**Preset**

You can reverse how the Depth control functions on the Utility -> System -> System Imaging. You can set the depth by probe and application on the Utility --> Imaging page.

**Values**

Depth increments vary by probe and application. Depth displays on the monitor in centimeters.

Depth values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits**

Depth adjusts your field of view. It increases your field of view to look at larger or deeper structures; it decreases your field of view to look at structures near the skin line.

**Affect on other controls**

After adjusting the depth, you may need to adjust the **TGC** and focus.

Changing Depth,

- Clears Cine memory.
- Erases real-time calculations graphics on the display (but not the completed results on the worksheet page).

**Bioeffects**

Changing the depth may change the TI and/or MI. Observe the output display for possible effects.

HINTS

Make sure enough space is left below the anatomy of interest to demonstrate shadowing or enhancement.

## Gain

**Description** B-Mode Gain increases or decreases the amount of echo information displayed in an image. It may have the effect of brightening or darkening the image if sufficient echo information is generated.

**Adjusting** To decrease/increase, rotate **Gain** (Mode key).

Gain values vary depending on the probe; they are not associated with a particular position of the knob.

*NOTE: TruAccess allows you to change the gain on a frozen image. B-Mode gain is independent of M-Mode and Doppler and Color Flow Gain. Changing the M-Mode Gain while in M-Mode does not affect the B-Mode image gain.*

**Preset** You can set gain by probe and application on the Utility --> Imaging page.

**Values** Gain displays on the monitor in Gn. Maximum gain varies by probe. Gain values vary by probe, application, and frequency setting.

*NOTE: Maximum gain is factory preset to an optimum setting to eliminate noise in the display.*

Gain values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Gain allows you to balance echo contrast so that cystic structures appear echo-free and reflecting tissue fills in.

**Affect on other controls** After you adjust the Power Output, you may need to adjust the gain. Generally speaking, if you increase the Power Output, you need to decrease the gain; if you decrease the Power Output, you need to increase the gain. Gain and TGC interact by adding together.

**Bioeffects** Gain has no affect on Power Output. However, with increased gain, the power output level can usually be reduced to produce an equivalent image quality.

*NOTE: Always optimize gain before increasing the Power Output.*

## Focus

**Description** Increases the number of focal zones, moves the focal zone(s) and changes the zone width so that you can tighten up the beam for a specific area. A graphic caret corresponding to the focal zone position(s) appears on the right edge of the image.

**Adjusting** To increase/decrease the number of focal zones, adjust ***Focus Num***.

To move the focal zone to the near/far field, adjust ***Focus Pos***.

To change the zone width, use ***Focus Width***.

*NOTE: Focus Position and Focus Number share the same control. The Focus control turns to move focus position when Focus Position is shown. Push in to show Focus Number. Turn to change the focus number.*

*NOTE: You can set the focus (Depth % and Number, and Number Crossbeam) by probe and application on the Utility--> Imaging page.*

**Values** Focus zone number and position vary depending on the depth, zoom, probe, application, and frequency setting selected.

Focal zone number values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Focus optimizes the image by increasing the resolution for a specific area.

**Affect on other controls** Changing the focal number affects the frame rate. The greater number of focal zones, the slower the frame rate.

**Bioeffects** Changing the focal zone may change the TI and/or MI. Observe the output display for possible effects.

## Auto Optimize

**Description**

Auto Optimize (Auto) lets you optimize the image based upon a the actual B Mode image data (Auto Tissue Optimize, ATO). The preset levels (Low, Medium, and High) allow you to pick a preference for the contrast enhancement in the resulting image. Low does the least amount of contrast enhancement, high does the most.

Auto is available in single or multi image, on live, frozen or CINE images (in B-Mode only), and while in zoom.

Auto in PW Doppler Mode (ASO: Auto Spectral Optimization) optimizes the spectral data. Auto adjusts the Velocity Scale/PRF (live imaging only), baseline shift, dynamic range, and invert (if preset). Upon deactivation, the spectrum is still optimized.

**Benefit**

Auto can be found in reduced optimization time and a more consistent and accurate optimization process.

**Adjusting**

To activate, press Right **Auto** key.

Press Left **Auto** key to turn off Auto.

**Preset**

Specify the ATO Level: Low, Medium, or High via Utility --> Imaging --> B-Mode.

Specify the Auto Invert on ASO for Doppler mode: On or Off via Utility --> System --> System Imaging. If you select On, automatically the spectrum displays in the upper side of baseline with ASO.

**Values**

Auto is active until you deactivate it or when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Affect on other controls**

You may need to adjust the Gain.

## CrossXBeam

**Description**

CrossXBeam is the process of combining three or more frames from different steering angles into a single frame. CrossXBeam is available on Convex and Linear probes.

CrossXBeam combines multiple co-planar images from different view angles into a single image at real-time frame rates, using bi-cubic interpolation.

**Adjusting**

CrossXBeam combines frames steered from a minimum of three different angles and up to a maximum of five steer angles (Convex probes) or up to a maximum of seven (7) steer angles (Linear probes).

To activate CrossXBeam, press the ***CrossXBeam*** key on the touch panel.

To adjust the number of frames being compounded, press the ***CrossXBeam#*** touch panel key. Select Low, Mid or High (Convex probes); or select Low, Mid High, or Max (Linear probes).

Select CrossXBeam Type (Hybrid, Mean, Max) via CrossXBeam Type on the touch panel. ***Max*** detects maximum values; ***Mean*** detects averaged values; ***Hybrid*** detects a mix of both average and maximum values.

**Preset**

You can preset B-Mode CrossXBeam:

- To activate upon entering B-Mode/Color Flow Mode/PW Doppler Mode
- Preset the CrossXBeam #
- Preset Focus Number for CrossXBeam
- Preset Line Density CrossXBeam
- Frame Average CrossXBeam
- CrossXBeam Usage (B, B/CF, B/CF/Elasto, B/Dop, B/CF/Dop, B/CF/Dop/CF+Dop, or B/CF/Elast/Dop/CF+Dop)

These presets can be made via the Utility --> Imaging page.

## CrossXBeam (continued)

**Values**

All linear and certain curved convex probes are supported. Multiple focal zones are supported. B-Mode CrossXBeam is available while in B-Mode, Color Flow, or PW Doppler Mode. Steering is optimized by probe. The displayed compound image depth is equal to the image depth of the non-steered frame.

The following controls are not available:

- Harmonic Imaging
- CINE Loops acquired using CrossXBeam.
- Read Zoom
- All Measurement and Analysis packages
- Virtual Convex (Linear probe)
- SRI HD, Line Density, Depth, Map, TGC, Gain, Edge Enhance, Frame Averaging, Compression, Colorize, Acoustic Output, Rejection, Rotation, Auto, Reverse, Dynamic Range, Biopsy, LOGIQView, 3D Imaging

The following features are supported in CrossXBeam:

- Anatomical M-Mode
- B-Flow

**Benefits**

The combined single image has the benefits of reduced speckle noise, reduced clutter, and continuity of specular reflectors. Therefore, this technique can improve contrast resolution with increased conspicuity of low contrast lesions, better detection of calcifications, biopsy needle visualization, and cystic boundary definition.

## SRI-HD (High Detection Speckle Reduction Imaging)

**Description**

SRI-HD (High Detection Speckle Reduction Imaging) is an adaptive algorithm to reduce the unwanted effects of speckle in the ultrasound image. Image speckle usually appears as a grainy texture in otherwise uniform areas of tissue. Its appearance is related to image system characteristics, rather than tissue characteristics, so that changes in system settings, such as probe type, frequency, depth, and others, can change the appearance of the speckle. Too much speckle can impair image quality and make it difficult to see the desired detail in the image. Likewise, too much filtering of speckle can mask or obscure desired image detail. Extra care must be taken to select the optimal SRI-HD level.

SRI-HD is available in B-Mode imaging and may be used with any transducer or clinical application when image speckle appears to interfere with the desired image detail.

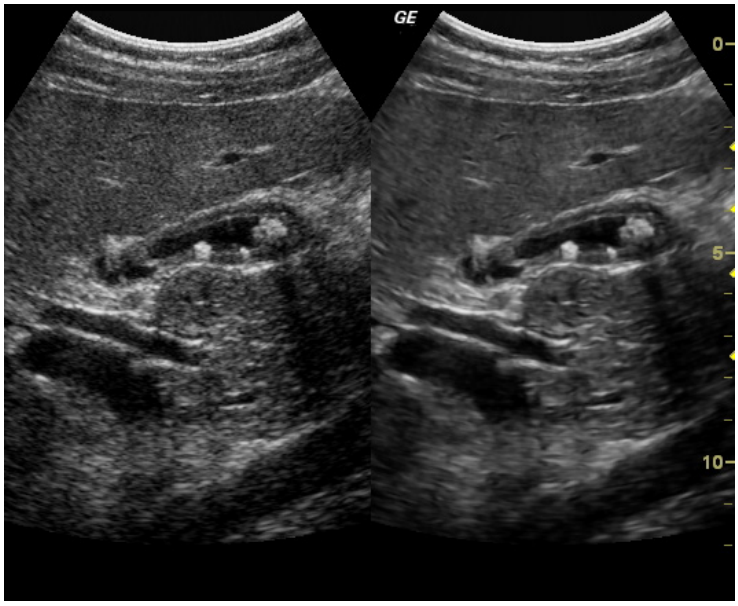



Figure 5-2. B-Mode Image before SRI-HD (left) and After SRI-HD (right)

## SRI-HD (High Detection Speckle Reduction Imaging) (continued)

**Values**

Varies, depending on the probe.

We recommend that you select the SRI-HD level by observing the enhanced image in side-by-side dual image comparison with the original, unprocessed image. Dual display mode is activated by pressing the L and R keys simultaneously.

In selecting the level of SRI-HD, you must observe the effects of SRI-HD in the desired region of interest and should make a real-time comparison with the original image. The optimal level depends on the clinical situation and improves with experience. Observing the original and SRI-HD-processed images together helps to determine whether too much or too little SRI-HD has been applied.

Dual image mode for SRI-HD can also be activated on a stored CINE Loop. This allows you to always see the original, unprocessed or enhanced image by going into the Dual display mode and to change the SRI-HD settings when reviewing the CINE Loop.

SRI-HD is available on 3D.

- You cannot change SRI-HD after the scan starts.
- The effects for the rendered image are less than the 2D-image.

**Benefits**

Smooths the image when image speckle interferes with the desired image detail.

## Coded Harmonic Imaging (CHI)

**Description** Harmonic imaging utilizes Digitally Encoded Ultrasound (DEU). Coded Harmonics enhances near field resolution for improved small parts imaging as well as far field penetration.

**Adjusting** To activate Coded Harmonic imaging, press ***CHI*** on the control panel.

*NOTE: You can specify the parameters for CHI in Utility -> Imaging -> HAR.*

*NOTE: Multi frequency is not active when the image is frozen.*

**Values** On/Off. `CHI' appears in place of 'B' in the Info Window.

*NOTE: Changing multi frequency resets those parameters which are presettable by frequency to their preset values for the current harmonic frequency.*

Multi frequency values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Application, or New Patient.

**Benefits** Coded Harmonics diminishes low frequency high amplitude noise and improves imaging technically difficult patients. Coded Harmonics may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver, and hard-to-visualize fetal anatomy.

**Bioeffects** Activating multi frequency mode may change the TI and/or MI. Observe the output display for possible effects.

## Frequency

**Description** Multi Frequency mode lets you downshift to the probe's next lower frequency or shift up to a higher frequency.

**Adjusting** To select a new frequency, adjust ***Frequency*** up or down.

The selected frequency appears in the upper, right-hand portion of the monitor display.

*NOTE: Frequency change is not active when the image is frozen.*

*NOTE: Changing frequency resets those parameters which are presettable by frequency to their preset values for the current frequency.*

**Values** Vary, depending on the probe and application.

Frequency values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** This optimizes the probe's wide band imaging capabilities at multiple frequencies to image at greater depths.

**Bioeffects** Activating multi frequency mode may change the TI and/or MI. Observe the output display for possible effects.

## Steer

**Description** You can slant the B-Mode or Color Flow linear image left or right to get more information without moving the probe. The angle steer function only applies to linear probes.

**Adjusting** To slant the linear image to the left/right, select **Steer**.

**Values** Linear probes can be steered left, center, or right up to a maximum of 15 degrees, depending on the probe.

Steer values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

**Preset** Reverse Steer Controls via Utility --> System --> System Imaging.

**Benefits** Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids.

**Bioeffects** Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

## Mode Cursor

**Description** Displays the M/D-Mode cursor on the B-Mode image.

**Adjusting** To activate/deactivate the M/D-Mode cursor, press **Mode Cursor** (left Set key). **Trackball** to position the M/D-Mode cursor. Adjust the Angle and SV Length as necessary.

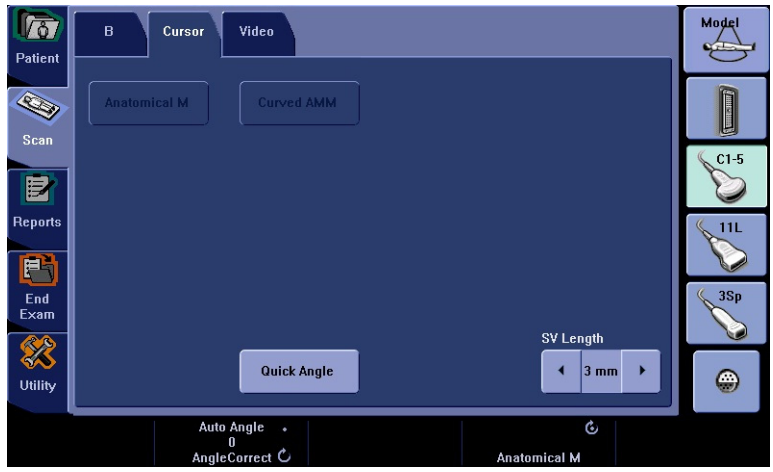



Figure 5-3. Cursor tab

**Benefits** Lets you position the cursor before you go into M-Mode or Doppler Mode so that you can make optimum use of the larger B-Mode image.

## Virtual Convex

**Description** On Linear and Sector probes, Virtual Convex provides a larger field of view in the far field. Virtual Convex is always active with Sector probes.

*NOTE: Virtual Convex is not available in CW while in Triplex.*

**Adjusting** To activate/deactivate Virtual Convex, select ***Virtual Convex***.

**Values** On/Off.

**Benefits** Virtual Convex allows for a wider field of view. Available in B-Mode, Color Flow Mode, and Doppler Mode. CrossXBeam is available on Virtual Convex with linear probes.

**Bioeffects** Activating Virtual Convex may change the TI and/or MI. Observe the output display for possible effects.

*NOTE: Color Flow can be steered when in straight fire, but not in Virtual Convex.*

## TGC

**Description** TGC amplifies returning signals to correct for the attenuation caused by tissues at increasing depths. TGC slide pots are spaced proportionately to the depth. The area each pot amplifies varies as well. A TGC curve may appear on the display (if preset), matching the controls that you have set (except during zoom). You can choose to deactivate the TGC curve on the image.

**Adjusting** To decrease/increase TGC, move slide pot to the left/right.

*NOTE: TGC adjusts automatically when using zoom.*

Do not apply too much power to the TGC slide pots as this could damage the slide pots.

**Values** When you change the depth, TGC is rescaled across the new depth range. Each pot is proportionately scaled across the depth.

**Preset** TGC Display On/Off -- preset via Utility --> System --> System Imaging.

**Benefits** TGC balances the image so that the density of echoes is the same throughout the image.

## Width

| | |
|---|---|
| **Description** | You can widen or narrow the size of the sector angle to maximize the image's region of interest (ROI). |
| **Adjusting** | To narrow/widen the angle, rotate the **Width** control. |
| **Values** | Varies, depending upon the probe (not applicable to linear probes) and application. |
| **Benefits** | Increase the sector angle to see a wide field of view; decrease the sector angle when you need to have a faster frame rate, as in fetal heart. |
| **Affect on other controls** | Changing the sector angle affects the frame rate. The narrower the sector angle, the faster the frame rate. |
| **Bioeffects** | Changing the sector angle may change the TI and/or MI. Observe the output display for possible effects. |

## Tilt

| | |
|---|---|
| **Description** | You can steer the sector angle to get more information without moving the probe while in B-Mode, M-Mode, Doppler Mode, and Color Flow Mode. *Tilt* is not available on Linear probes. |
| **Adjusting** | To tilt the angle to the left/right, adjust *Tilt* using a Trackball key when shown on the Trackball controls on the display. |
| **Values** | Varies, depending on the probe. |
| **Benefits** | Allows you to move a reduced sector angle laterally, without moving the probe. Beneficial in GYN. |
| **Bioeffects** | Steering the sector angle may change the TI and/or MI. Observe the output display for possible effects. |

## Dynamic Range

| | |
|---|---|
| **Description** | Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast.<br><br>The Dynamic Range control name changes to Compression on frozen images. |
| **Adjusting** | To increase/decrease, adjust Dynamic Range. |
| **Values** | The settings cycle in 3dB or 6dB steps from 36 dB to 96 dB. The current value displays. Dynamic Range values vary by probe, application, and frequency setting.<br><br>Dynamic Range levels are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient, or Multi Frequency. |
| **Benefits** | Dynamic Range is useful for optimizing tissue texture for different anatomy. Dynamic Range should be adjusted so that the highest amplitude edges appear as white while lowest levels (such as blood) are just visible. |
| **Affect on other controls** | Dynamic range operates in realtime, Freeze, CINE, and CINE Timeline, but is not available while in DVR playback. It also affects Gain. |

## Reverse

**Description** Flips the image 180 degrees left/right.

**Adjusting** To flip the image 180 degrees, press the **Reverse** key under the TGC slide pots.

OR

Check box at Utility--> System--> System Imaging--> Pushing Depth Rotary Performance Image Reverse, then push Depth Rotary.

**Values** The image rotates in 180 degrees left/right. Reverse settings vary by probe and application.

Reverse settings are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Used for anatomical correctness.

When reading a reverse image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

## Line Density

**Description** Optimizes B-Mode frame rate or spatial resolution for the best possible image.

**Adjusting** Press ***Line Density*** right to increase resolution or left to increase frame rate.

Select the default value for Line Density on the Utility -> Imaging -> B preset page and press ***Save***.

**Values** Varies by probe.

*NOTE:* *Not available in timeline.*

Values vary by probe and application. Line Density values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** A lower line density is useful in fetal heart beat, adult cardiac applications and in clinical Radiology applications requiring significantly higher frame rates.

A higher line density is useful in obtaining very high resolution, e.g., thyroid, testicles.

**Affect on other controls** Line density changes the vector density and frame rate.

**Bioeffects** Activating color flow line density may change the TI and/or MI. Observe the output display for possible effects.

## Line Density Zoom

**Description** You can set the default value for Line Density in zoom independently.

**Adjusting** Select the default value on the Utility -> Imaging -> B -> Line Density Zoom and press ***Save***.

## Colorize

**Description**

Colorize is the colorization of a conventional B-Mode image or Doppler Spectrum to enhance the user's ability to discern B, M, and Doppler Mode intensity valuations. Colorize is NOT a Doppler Mode.

*NOTE: You can colorize realtime or CINE images or Timeline CINE.*

Colorizes the gray scale image to enhance the eye's discrimination capability.

Spectrum Colorize colorizes the spectrum as a function of power using the inverse of the Colorize map for the signal intensity in each Doppler line.

Colorize enhances the visibility of the spectrum's characteristics and enhances your ability to identify spectral broadening and the edge contours of the spectrum used to define the peak frequency/velocity.

The gray bar displays while Colorize is activated.

**Adjusting**

To activate Colorize,

1. Select ***Colorize*** on the touch panel.
2. **Trackball** to cycle through available maps.
3. Press **Set** to select.

To deselect, select a gray map.

## PRF

**Description** Reduces noise artifacts in the image. When you activate PRF, the frame rate decreases and the noise artifacts are filtered.

*NOTE: Available for only Cardiac application.*

## Edge Enhance

**Description** Edge Enhance brings out subtle tissue differences and boundaries by enhancing the gray scale differences corresponding to the edges of structures. Adjustments to M-Mode's edge enhancement affects the M-Mode only.

**Benefits** Edge Enhance cleans out the B-Mode image/M-Mode timeline by subduing some of the gray scale in order to highlight the vessel wall or organ. This is helpful when you cannot differentiate between the chambers of the heart.

**Affect on other controls** Edge Enhance operates in real-time only; not in Freeze or CINE.

## Frame Average

**Description** Temporal filter that averages frames together, thereby using more pixels to make up one image. This has the effect of presenting a smoother, softer image.

**Benefits** Smooths the image.

## Maps

**Description**

The system supplies B, M, and Doppler Mode system maps.

Maps are preset-specific and are arranged in order from the softest map on the top of the menu to the most contrasty map on the bottom of the menu.

The only exception is Map J, which is a very soft map.

In Doppler mode, the Clear map offers a bluish coloring compared to the standard gray map. Clear Maps provide a more transparent map. Clear maps are displayed under gray maps.

**Adjusting**

To select a map, press the ***Gray Map*** touch panel key. A map window displays. The image reflects the map as you go through the selections.

**Values**

Map values vary by probe, application, and frequency setting. Map values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

## Rejection

**Description**

Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).

**Benefits**

Allows for the elimination from the display of low level echoes caused by noise.

## Rotation

**Description** Flips the image 180 degrees up/down.

**Benefits** Beneficial in transvaginal and transrectal scanning.

When reading a rotated image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

## Suppression

**Description** Suppresses the noise in the image.

## B-Flow (Option)

**Description**

B-Flow is intended to provide a more intuitive representation of non-quantitative hemodynamics in vascular structures.

All B-Mode measurements are available with B-Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, and enclosed area.

**Activating**

To activate/deactivate B-Flow, press **B-Flow** button in the control panel. Doppler Mode is available while in B-Flow; however, M-Mode and Color Flow/PDI Modes are not available.

**Using B-Flow**

To optimize the image:

Adjust the gain, optimize the image for frame rate/resolution via Line Density, adjust the focal zone, zoom the image, colorize the image, adjust the field of view via Scan Area, select Auto.

Consequently, imaging parameters and presets are functionally the same as B-mode when in B-Flow Tissue mode.

**Scanning Hints**

B-Flow is especially intuitive when viewing blood flow, for acute thrombosis, parenchymal flow, and jets. B-Flow helps you visualize complex hemodynamics and highlights moving blood and tissue. B-Flow was implemented using Digitally Encoded Ultrasound (DEU). There are no artifacts such as bleeding, blooming, or aliasing.

The greater the speed, the better the image scatter density and size. If the scan direction is the same as the flow direction, then the image scatter is elongated; if the scan direction is the opposite as the flow direction, then the image scatter is tighter. Therefore, have the scan direction opposite to that of flow direction. Switch the way you hold the probe, with the probe orientation marker inferior to maintain correct orientation on the monitor. Flow starts from where the focal zone is located.

Turn off the background when imaging the kidney, liver, and spleen. Keep the focal zone as close to flow as possible. It is beneficial to narrow the sector width and increase the frame rate.

## B-Flow (Option) (continued)

**Benefits**

B-Flow is less angle-independent, no velocity-aliasing artifacts, and provides better resolution when compared with Color Doppler Mode, and displays a full field of view. B-Flow is therefore a more realistic (intuitive) representation of flow information, allowing you to view both high and low velocity flow at the same time.

**Affect on other controls**

When you activate B-Flow, the image remembers the imaging parameters set while in B-Mode. When you optimize the frame rate via Line Density, you compromise the resolution and when you optimize the resolution, you compromise the frame rate. B-Flow is not available in 3DView.

**Bioeffects**

When you select B-Flow, the PRF increases.

### Flow Type

**Description**

Available in B-Flow.

**Value**

Low or High.

- Low= Most sensitivity for slow flow (venous, small parts). This setting has the slowest frame rate.
- High= Most sensitivity for fast flow. Provides the highest frame rate and better detection of flow dynamics. Use whenever possible to capitalize on the high frame rate.

## B-Flow (Option) (continued)

### Accumulation

**Description** Accumulation enhances the flow in an image.

**Benefit** Accumulation detects the maximum signal and holds it for the level specified (1-7).

### Background

**Value** On or Off.

**Description** In the Background ON mode, both of B-Flow and B-mode are displayed in one image.

### Sensitivity PRI

**Description** Sensitivity PRI is used to adjust the flow detect sensitivity depending on the flow speed.

## B-Flow (Option) (continued)

### B-Flow Color (BFC)

**Description**

B-Flow Color is intended to provide a B-Flow representation with colorized flow and background B-Mode image.

Although the BFC is based on B-Flow technology, the BFC image is processed and made by the Color Flow processor and therefore has both the advantages of B-Flow and Color Flow. Consequently, imaging parameters and presets are functionally the same as Color Flow/PDI.

Refer to ‘Color Flow Mode’ on *page 5-42* for details on each parameter.

*NOTE: You can preset BFC parameters in Utility--> Imaging--> BFC.*

*NOTE: While in BFC, you can steer the PW cursor or CF ROI independently.*

**Activating**

To activate B-Flow Color,

1. While in B-Mode, press **B-Flow** to activate B-Flow. Then press **Color** on the touch panel.
2. Adjust the parameters to get the best image.

### Enhance (B-Flow Color)

**Description**

***Enhance*** provides a range of choices for B-Flow Color image quality.

**Values**

Enhance “Off” is the original B-Flow Color setting which gives you the dynamic appearance of the flow with high frame rate.

Enhance “On” adds sensitivity and stability/continuity to the flow’s appearance, along lower frame rates than Enhance “Off.”

## LOGIQView (Option)

**Description**

LOGIQView provides the ability to construct and view a static 2D image which is wider than the field of view of a given transducer. This feature allows viewing and measurements of anatomy that is larger than what would fit in a single image. Examples include scanning of vascular structures and connective tissues in the arms and legs.

LOGIQView constructs the extended image from individual image frames as the operator slides the transducer along the surface of the skin in the direction of the scan plane. The quality of the resulting image is somewhat user-dependent and requires some additional skill and practice to develop proper technique and become fully proficient.

LOGIQView is not available for the following:

- Multi Image
- Timeline Modes
- B-Flow Mode
- Color Flow Mode
- PDI Mode

**Benefits**

The user can look at a larger region of interest within one field of view that is wider than any given probe would normally provide.

**Clinical Use**

LOGIQView is intended for scanning areas too large to fit on one image.

**Using LOGIQView**

To perform an exam using LOGIQView,

1. Perform a detailed examination of the anatomy/pathology. Optimize parameters for tissue texture and visible window PRIOR TO activating LOGIQView.
2. Press the LOGIQView key on the Control Panel.
3. To start acquiring the image, press ***Start*** (Trackball key).

HINTS

When you scan, scan slowly and in a uniform motion lengthwise, end-to-end (with or against the probe orientation marker). LOGIQView acquires images via leading edge vectors (and does not acquire slices, as in CINE). The image is being stored as you perform the scan and you can watch the LOGIQView as it is being acquired.

## LOGIQView (Option) (continued)

4. To restart the scan, press ***Start*** again. You can back up the probe, realign it, then go forward to redo a portion of the scan.
5. To complete the scan, press ***End*** or Freeze (or allow the scan to auto complete. The LOGIQView is then displayed, scaled to fit entirely on the screen.
6. Perform measurements and record images.

*NOTE: Measurement error is within 10% or 4mm of the distance you measured for all linear probes.*

**Uniform Motion**

The quality and usefulness of LOGIQView images is affected by transducer motion. Incorrect technique can contribute to image distortion.

Guidance and precautions for uniform motion:

- Continuous contact is required throughout the length of the extended image. DO NOT lift the transducer from the skin surface.
- Always keep the transducer perpendicular to the skin surface. DO NOT rock the transducer.
- Keep the motion within the same scan plane, if possible. DO NOT slide the transducer laterally.
- Lateral turning (change in direction to follow anatomical structure) can be accommodated with slower motion. DO NOT make abrupt changes in direction.
- The system accommodates a reasonable range of motion velocity. DO NOT make abrupt changes in speed of motion. Deeper scans generally require reduced speed.

**Bioeffects**

Activating LOGIQView has no affect upon Acoustic Output values.

## B Steer+ (Option)

| | |
|---|---|
| **Description** | The user can enhance detectability of the biopsy in the tissue without slanting the entire B-Mode image. |
| **Adjusting** | To slant the linear image to the left/right, move **Steer+** to the left/right.<br><br>To adjust the B Steer+ angle, select the appropriate beam angle from the touch panel.<br><br>To increase/decrease the needle gain for needle detection, adjust the needle gain control. |
| **Values** | Linear probes can be steered left, center, or right up to a maximum of 40 degrees, depending on the probe.<br><br>B Steer values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient. |
| **Preset** | B Steer+ Enable/Disable - preset via Utility --> Imaging --> General. |
| **Benefits** | Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids. |

## B Steer+ (Option) (continued)

**Bioeffects**

Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

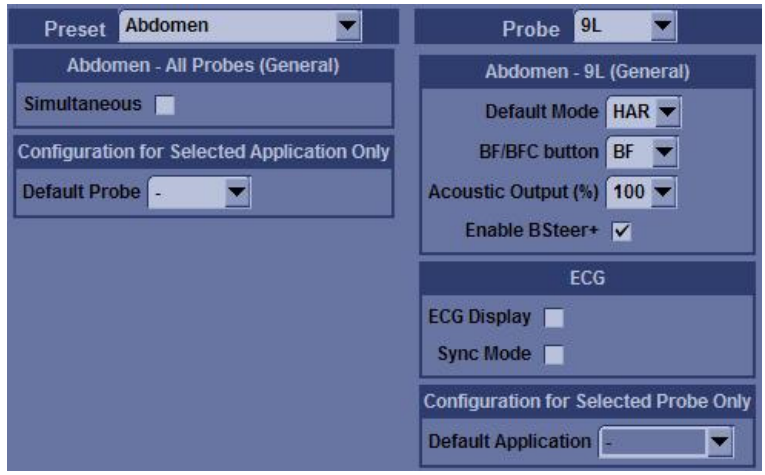



Figure 5-4. Enable B Steer+

# Optimizing M-Mode

## Intended Use

M-Mode is intended to provide a display format and measurement capability that represents tissue displacement (motion) occurring over time along a single vector.

## Introduction

M-Mode is used to determine patterns of motion for objects within the ultrasound beam. The most common use is for viewing motion patterns of the heart.

LOGIQ S7 Expert/Pro has three types of M-Mode:

- Conventional M-Mode: displays a distance/time plot of a cursor line in the axial plane of the 2D-image. Conventional M-Mode can be combined with Color Mode.
- Anatomical M-Mode (AMM)
- Curved Anatomical M-Mode (CAMM)

## Typical exam protocol

A typical examination using M-Mode might proceed as follows:

1. Get a good B-Mode image. Survey the anatomy and place the area of interest near the center of the B-Mode image.
2. Press **Mode Cursor**.
3. Trackball to position the mode cursor over the area that you want to display in M-Mode.
4. Press M-Mode.
5. Adjust the Sweep Speed, TGC, Gain, Power Output, and Focus Position, as needed.
6. Press **Freeze** to stop the M trace.
7. Record the trace to disk or to the hard copy device.
8. Press **Freeze** to continue imaging.
9. To exit, press M-Mode.

## M-Mode Display

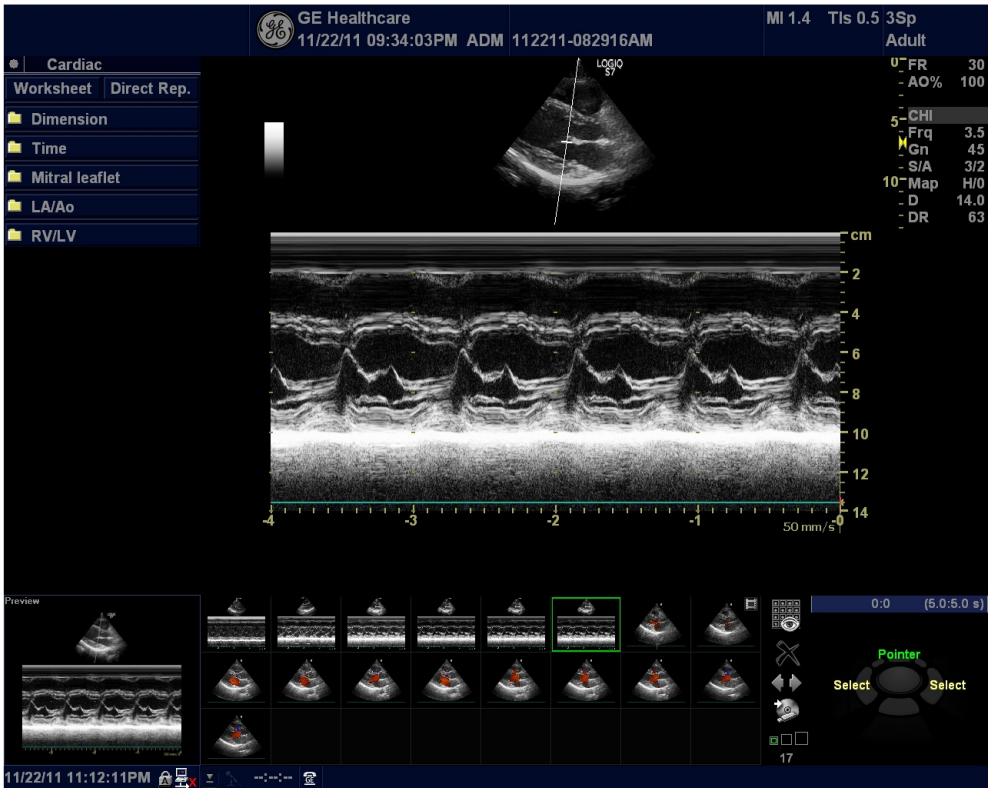



Figure 5-5. M-Mode Display -- Representative Example

## Scanning Hints

HINTS

These M-Mode controls produce the following results:

***Sweep Speed***. Controls speed of M-Mode update.

***Dynamic Range***. Affects the amount of gray scale information displayed.

## Sweep Speed

**Description**

Changes the speed at which the timeline is swept.

Available in M-Mode and Doppler Mode.

Available in M Color Flow Mode.

**Adjusting**

To increase/decrease, select ***Sweep Speed***.

**Values**

Each selection represents a different sweep time.

Sweep Speed values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits**

You can speed up or slow down the timeline to see more or fewer occurrences over time.

*NOTE:* *The sweep speed information represents the user selected sweep speed and should be used only as a reference to confirm that the image was acquired at the selected sweep speed. It is not to be used for measurements or analysis. This is not an absolute value, but simply a reference number. Users performing studies using standardized protocols may find this sweep speed information useful for reading studies from other institutions.*

## Anatomical M-Mode

**Description**

Anatomical M-Mode gives you the ability to manipulate the cursor at different angles and positions. The M-Mode display changes according to the position of the cursor.

Anatomical M-Mode displays a distance/time plot from a cursor line, which is independent from the axial plane. AMM is available in B, Color and TVI.

*NOTE: To set up AMM, go to Utility--> Imaging--> AMM. Select the specific probe and parameters.*

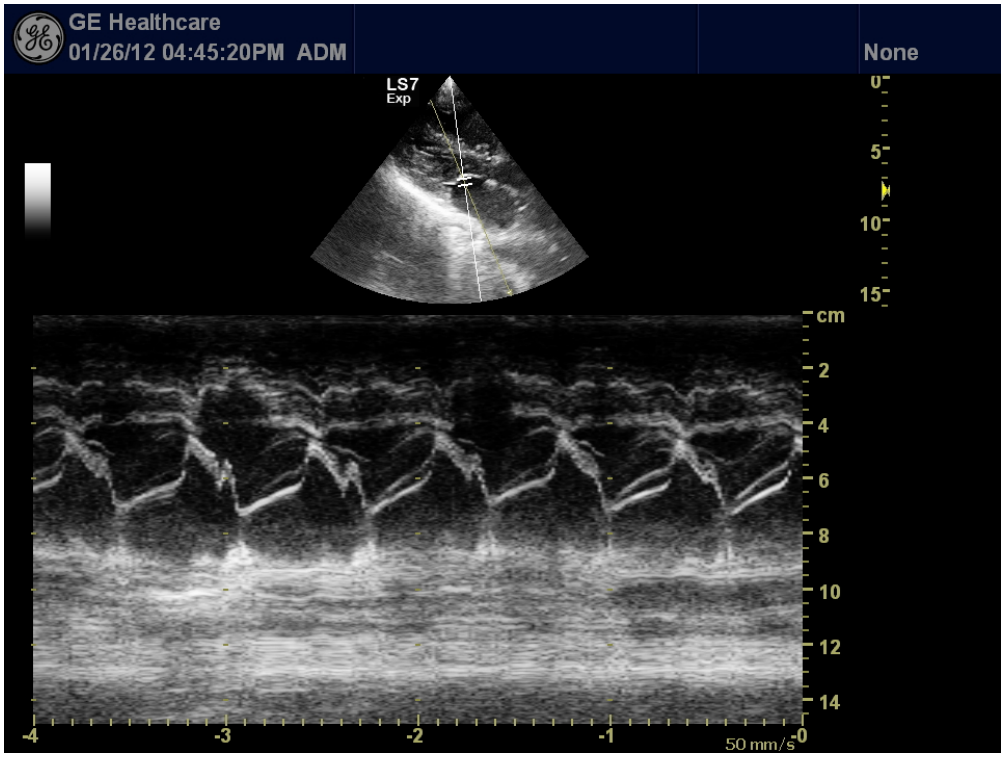



Figure 5-6. Anatomical M Mode

## Anatomical M-Mode (continued)

**Activating**

To activate Anatomical M-Mode:

*NOTE: AMM is only available on the sector probe.*

1. While in M-Mode, press the ***Anatomical M*** knob on the bottom of the touch panel.

   or

   Press **Set** (Mode Cursor) while in B/B+CF/B+PDI and select ***Anatomical M*** to go to live B/B+CF/B+PDI + AMM.

*NOTE: Anatomical M-Mode can also be used with previously acquired digitally stored 2D images. More than one heart cycle should be stored if performing M-Mode in post processing.*

2. Use the trackball (assigned function: Pos) to position the M cursor over the required area of the image.
3. Press the top Trackball key to allow free rotation of the solid arrow line throughout the 2D image (trackball assigned function: Angle).

*NOTE: Rotate the touch panel control to angle the M cursor at a given angle.*

**Benefits**

Color Flow Mode and Color M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.

**Bioeffects**

Changing the Packet Size, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

## Curved Anatomical M-Mode (CAMM)

Curved Anatomical M-Mode (CAMM) displays a distance/time plot from a free-drawn cursor line. CAMM is available in B, CF and TVI.

*NOTE: Curved Anatomical M-Mode can also be used with previously acquired digitally stored B-Mode images.*

*NOTE: CAMM is only available on the sector probes.*

1. While in AMM mode, Change Curved AMM to ON in the M Mode tab.
2. Use the Trackball to position the start point of the time motion curve in the B-Mode image.
3. Press **Set** to fix the start point.
4. Use the Trackball to position the next point.

   The time motion curve is drawn by the green line.
5. Press **Set** to fix the point.
6. Repeat step 4 and 5 to draw a complete time motion curve.

*NOTE: The time motion curve can be edited by following the curve back to the desired point and redrawn as desired. Following the curve back to the starting point will delete the time motion curve.*

7. Press **Set** twice to complete.
8. The arrow cursor appears on the M-Mode image and the red bar appears on the time motion curve.

   The red bar indicates the position of the time motion curve relative to the arrow cursor on the CAMM image. They move relative to one another.

# Optimizing Color Flow

## Intended Use

Color Flow Mode is a Doppler Mode intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode image.

## Introduction

A typical examination using Color Flow Mode,

1. Follow the same procedure as described under B-Mode to locate the anatomical area of interest.
2. After optimizing the B-Mode image, add Color Flow.

*NOTE:* *Use all noise reduction controls with care. Excessive application may obscure low level diagnostic information.*

3. Move the color flow area of interest as close to the center of the image as possible.
4. Optimize the color flow parameters so that a high frame rate can be achieved and appropriate flow velocities are visualized.
5. Press **Freeze** to hold the image in memory.
6. Record color flow images as necessary.
7. If more definitive information is needed about flow, utilize the procedures described under Doppler Mode.
8. To exit Color Flow, press **CF**-Mode or **B**-Mode.

## Color Flow Mode

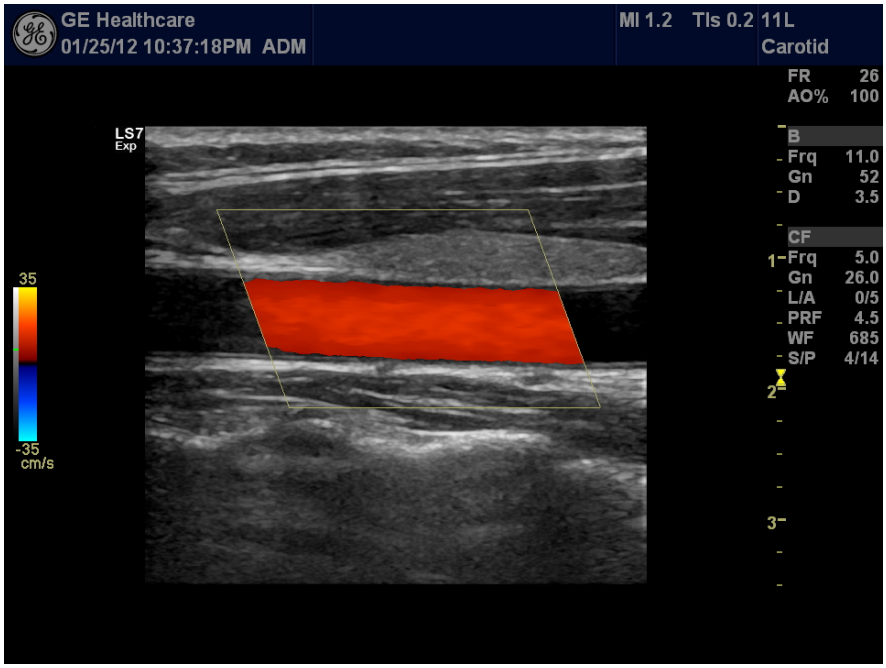



Figure 5-7. Color Flow Mode screen - Representative Example

## Uses

Color Flow is useful to see flow in a broad area. Color Flow allows visualization of flow in the CF ROI, whereas Doppler Mode provides spectral information in a smaller area.

Color Flow is also sometimes used as a stepping stone to Doppler. You use Color Flow to locate flow and vessels prior to activating Doppler.

HINTS

Color Flow Mode controls produce the following results:

***Line Density***. Trades frame rate for sensitivity and spatial resolution. If the frame rate is too slow, reduce the size of the region of interest, select a different frame rate setting, or reduce the packet size.

***Wall Filter***. Affects low flow sensitivity versus motion artifact.

Color ***Threshold***. Percentage of gray scale level where color Doppler is overwritten.

Frame Average. Affects temporal smoothing and color Doppler `robustness.'

***Flash Suppression***. Flash Suppression is a proprietary algorithm for motion artifact control.

***Packet Size***. Affects the amount of color Doppler sensitivity versus frame rate.

**Size**. Adjust the size of color window.

***Focus Position***. The best focusing is at the focal zone location. Put focal zone(s) at the area of interest.

## Flow Selection

In the Lower Extremity Vein (LEV) and Abdominal applications, you can quickly select the flow state via a shortcut on the Color Flow Mode touch panel menu.

In the Abdominal application on the Color Flow touch panel, you will see Aorta, Renal, or Penetration flow selections.

In the Vascular Exam Category--> LEV Application on the Color Flow touch panel menu, you will see Low Flow or Fast Flow selections.

## Gain

| | |
|---|---|
| **Description** | Gain amplifies the overall strength of echoes processed in the Color Flow window or spectral Doppler timeline. |
| **Adjusting** | To decrease/increase Gain, rotate **Gain** (Mode key).<br><br>Gain values change depending on the probe and application; they are not associated with a particular position of the button. |
| **Values** | Values vary by probe, application, and multi frequency setting. Gain displays as dB. Gain values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient, or Multi Frequency. |
| **Benefits** | Allows you to control the amount of color within a vessel or to fill in or clean out spectral information. |
| **Bioeffects** | Gain has no affect on Power Output. However, with increased Gain, the power output level can usually be reduced to produce an equivalent image quality. |

## Scale (Velocity Scale)

| | |
|---|---|
| **Description** | Increases/decreases the Scale on the color bar. |
| **Adjusting** | To raise/lower the velocity scale, adjust **Scale**. |
| **Values** | Scale is in kHz.<br><br>Velocity Scale values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient. |
| **Benefits** | Imaging of higher velocity flow requires increased scale values to avoid aliasing. |
| **Affect on other controls** | Changing the Velocity Scale may affect Power Output, frame rate, and wall filter. When you adjust the velocity scale, CINE memory is cleared. |
| **Bioeffects** | Changing the Velocity Scale range may change the TI and/or MI. Observe the output display for possible effects. |

## Wall Filter

**Description** Filters out low flow velocity signals. It helps get rid of motion artifacts caused from breathing and other patient motion.

**Values** Values vary, depending upon probe, application, and packet size. The wall filter is displayed numerically on the monitor (Hz).

Wall Filter values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Gets rid of excess, unnecessary low frequency signals caused by motion.

## Wall Filter Target Override (Hz)

**Description** Wall filter target override sets to "**0**".

The algorithm selects a new regression wall filter that updates the wall filter setting and the wall filter cutoff on the user display. If using this algorithm, the system automatically maintains a target wall filter cutoff as the scale is changed. The target wall filter cutoff is initially set by the results of the user-defined presets for wall filter, scale. The target regression wall filter cutoff shall be updated when the user changes the wall filter setting.

Wall filter target override sets to "**-1**".

The algorithm keeps a user selected regression wall filter, when the user changes the color scale.

Wall filter target override sets to other value.

The algorithm selects a new regression wall filter that updates the wall filter setting and the wall filter cutoff on the user display. In this case, the selected value from the user is the target cut off (Hz).

**Values** Set the value on the Utility -> Imaging -> CF -> Wall filter Target Override (Hz) preset and press ***Save***.

## Size/Position of the color window

| | |
|---|---|
| **Description** | Adjust size and position of the color window. |
| **Adjusting** | The window grows from the center of the color window. To adjust the size, press the top trackball key to select ***Size*** (Size/ Position appears in the **Trackball** keys on the monitor display) then move the Trackball left/right, up/down. To adjust the position, press the top trackball key to select ***Pos*** then move the **Trackball** to position the color window. |
| **Values** | Sector and Convex Probes. Ranges from 5 degrees to full B-Mode image.<br><br>Linear Probe. Ranges from 5mm to full B-Mode image. |
| **Benefits** | Increase the color window to see a larger area; decrease the color window to improve frame rate and spatial resolution. |
| **Affect on other controls** | The smaller the color window, the faster the frame rate and vice versa. |
| **Bioeffects** | Sizing the color window may change the TI and/or MI. Observe the output display for possible effects. |

## CF/PDI Width

| | |
|---|---|
| **Description** | You can set the default CF/PDI ROI width. |
| **Adjusting** | Select the value on the Utility -> Imaging -> CF mode and press ***Save***. |

## CF/PDI Vertical Size

| | |
|---|---|
| **Description** | You can set the default CF/PDI ROI vertical size. |
| **Adjusting** | Select the value on the Utility -> Imaging -> CF mode and press ***Save***. |

## Invert (Color Invert)

**Description** Lets you view blood flow from a different perspective, e.g., red away (negative velocities) and blue toward (positive velocities). You can invert a real-time or frozen image.

*NOTE: Invert reverses the color map, NOT the color PRF.*

**Adjusting** To reverse the color flow, press ***Invert (Color Invert)*** .

In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.

**Values** Invert values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Allows you to view blood flow according to your personal preference, without flipping the probe.

## Baseline

**Description** Changes the Color Flow or Doppler spectrum baseline to accommodate higher velocity blood flow. Minimizes aliasing by displaying a greater range of forward flow with respect to reverse flow, or vice versa.

Baseline adjusts the alias point. The default baseline is at the midpoint of the color display and at the midpoint of the color bar reference display.

**Adjusting** To adjust the baseline, adjust ***Baseline*** up/down, as necessary.

**Values** Zero velocity follows the baseline. The total PRF range remains the same. Values vary by probe and application.

Baseline values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Unwraps the alias during color flow imaging. Higher velocities can be displayed without reversal of colors.

## Angle Steer

**Description** — You can slant the ROI of the Color Flow linear image left or right to get more information without moving the probe. The Angle Steer function only applies to linear probes.

**Adjusting** — To slant the linear image to the left/right, adjust **Angle Steer**.

Angle Steer can be set in Utility -> Imaging -> CF/PDI Limit to 3 Angle Steer if you want to use all angles or just available only 3 angles (left 20, 0, right 20).

**Values** — Linear probes can be steered left (20, 15, 10 degrees), center, or right (20, 15, 10 degrees). Angle Steer values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New patient

**Benefits** — Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids.

**Bioeffects** — Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

## Accumulation

**Description** — Accumulation enhances the flow in an image.

**Values** — 8 settings: Off, 6 Various levels, or frames, of accumulation, and Infinite. If Accumulation is turned off, then Frame Averaging is used; if Accumulation is set, then Accumulation is used.

**Availability** — Available in Contrast, Color Flow, PDI, and B-Flow.

**Benefit** — Accumulation detects the maximum signal and holds it for the level specified.

## Color Flow Line Density

| | |
|---|---|
| **Description** | Optimizes the Color Flow frame rate or spatial resolution for the best possible color image. |
| **Adjusting** | To adjust the line density, select the ***Line Density*** touch panel key.<br><br>Select the default value on the Utility -> Imaging -> CF -> Line Density and press ***Save***. |
| **Values** | The current frame rate is shown on the touch panel. Frame Rate/Resolution values vary by: Probe, Exam Category, Exam Calcs, New Patient, and Frequency.<br><br>Settings are returned to factory or user preset value when you change any of the above. |
| **Benefits** | Low line density is useful in fetal heartbeat, adult cardiac applications, and clinical Radiology applications which require significantly higher frame rates. High resolution is useful in situations where very small vessels are being imaged, e.g., thyroid, testicles. |
| **Affect on other controls** | Line density changes the vector density and frame rate. |
| **Bioeffects** | Modifying line density may change the TI and/or MI. Observe the output display for possible effects. |

### Line Density Zoom

| | |
|---|---|
| **Description** | You can set the default value for Line Density in zoom independently. |
| **Adjusting** | Select the default value on the Utility -> Imaging -> CF -> Line Density Zoom and press ***Save***. |

## Map

**Description** Allows you to select a specific color map. After you have made your selection, the color bar displays the resultant map.

**Adjusting** After you activate Color Flow, the Color Flow touch panel displays. To cycle through available maps, select ***Map***, move the **Trackball** to view available maps, and press **Set** to select.

**Values** Velocity Maps (V). Flow shown as blue away/red toward the probe.

Velocity Variance Maps (VV). Provides a measure of turbulence (stenosis). Adds green to velocity maps.

**Benefits** Shows the direction of the flow and highlights the higher velocity flows.

## Map Compress

**Description** When you increase the value, high velocity elements in the map are compressed so that the map darkens. When you decrease the value, low velocity elements in the map are compressed so that the map lightens. The effect is visible in the color bar.

**Benefits** Changes the gradation in the map.

## Threshold

**Description** Threshold assigns the gray scale level at which color information stops.

**Adjusting** To increase/decrease the gray scale threshold, select ***Threshold*** left/right.

**Values** The settings cycle through various values: 0%-100% of the gray scale. High values display more color; low values displays more B-Mode gray scale data. The Color Threshold level is displayed on the touch panel.

Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Limits color flow overlay to low level echoes inside vessel walls. Helps minimize color `bleeding' outside vessel walls.

## Frame Average

**Description** Averages color frames.

**Adjusting** To smooth temporal averaging, select ***Frame Average***. The selected value displays on the touch panel.

**Values** Frame Average values vary by probe and application. The values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Higher frame averaging keeps the color displayed longer for increased flow visualization while lower frame averaging provides greater flow dynamics.

**Affect on other controls** Trades off between frame rate and color quality. As the color quality increases, the frame rate may decrease and as the frame rate increases, the color image quality decreases.

## Transparency Map

**Description** Brings out the tissue behind the color data.

**Adjusting** Select ***Transparency Map*** to adjust

*NOTE: Select the default value on the Utility -> Imaging -> CF -> Transparent select and press **Save**.*

**Benefits** Helps demonstrate the tissues behind the color.

## Spatial Filter

**Description** Smooths out the color, makes it look less pixely.

**Adjusting** Select ***Spatial Filter*** to adjust.

*NOTE: Select the default value on the Utility -> Imaging -> CF -> Spatial Filter and press **Save**.*

**Benefits** Smooths the image.

## Flash Suppression

**Description** Activates/deactivates Flash Suppression, a motion artifact elimination process.

**Values** Values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Beneficial to suppress flash.

## Packet Size

| | |
|---|---|
| **Description** | Controls the number of samples gathered for a single color flow vector. |
| **Values** | Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient. Values are displayed on the monitor display as P. |
| **Benefits** | Allows you to improve the color sensitivity and accuracy of color averaging (increase packet size) or frame rate (decrease packet size), as needed. |
| **Affect on other controls** | When you decrease the packet size, you increase the frame rate at the expense of image quality. When you increase the packet size, you improve image quality at the expense of frame rate. |
| **Bioeffects** | Changing packet size may change the TI and/or MI. Observe the output display for possible effects. |

## Sample Vol (Sample Volume)

| | |
|---|---|
| **Description** | Adjusts the size of the color flow doppler transmit wave (or pulse) and size (or length). Lower setting gives better flow resolution and a higher setting increases sensitivity. |

## CF/PDI Auto Sample Volume

| | |
|---|---|
| **Description** | You can set the default CF/PDI Auto Sample Volume. |
| **Adjusting** | Select the value on the Utility -> Imaging -> CF -> CF/PDI Auto Sample Volume and press ***Save***. |

## CF/PDI Center Depth

**Description** You can set the default CF/PDI center depth.

**Adjusting** Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

## CF/PDI Focus Depth (%)

**Description** You can set the default CF/PDI center depth.

**Adjusting** Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

## CF/PDI Frequency (MHz)

**Description** You can set the default CF/PDI Frequency (MHz).

**Adjusting** Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

## CF/PDI Auto Frequency

**Description** You can set the default CF/PDI Auto Frequency.

**Adjusting** Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

## Power Doppler Imaging (PDI)

**Description**

Power Doppler Imaging (PDI) is a color flow mapping technique used to map the strength of the Doppler signal coming from the flow rather than the frequency shift of the signal. Using this technique, the ultrasound system plots color flow based on the number of reflectors that are moving, regardless of their velocity. PDI does not map velocity, therefore it is not subject to aliasing.

**Adjusting**

Press **PDI**. The color flow window appears over the B-Mode image. Move the Trackball to move the CF window. To exit, press **PDI** or select a new mode.

**Values**

On/Off.

Twelve power and one directional PDI maps are available.

**Benefits**

Since PDI does not display velocity, it does not alias.

**Affect on other controls**

When PDI is activated, the following controls are adjusted: Color Map is set to a power map. Line Density is adjusted. Threshold is set to 100%. Frame Averaging is adjusted. Packet Size is adjusted.

*NOTE: These controls are reset to their previous values upon exiting PDI.*

HINTS

When changing maps, higher gain settings may be needed.

## Directional Power Doppler

You can select the P7 Directional Power Doppler map while in PDI.

*NOTE: If you store a PDI image and recall it, you can still switch to the Directional Power Doppler map and vice versa. However, an image stored as non-directional then switched to directional just adds direction to a non-directional map and vice versa.*

HINTS

If the image is aliasing while in Directional Power Doppler, increase the Scale and reduce the Wall Filter.

## Tissue Velocity Imaging (TVI) (Option)

### Intended Use

Tissue Velocity Imaging (TVI) calculates and color-codes the velocities in tissue. The tissue velocity information is acquired by sampling of tissue Doppler velocity values at discrete points.The information is stored in a combined format with gray scale imaging during one or several cardiac cycles with high temporal resolution.

TVI can be activated on the sector probes only.

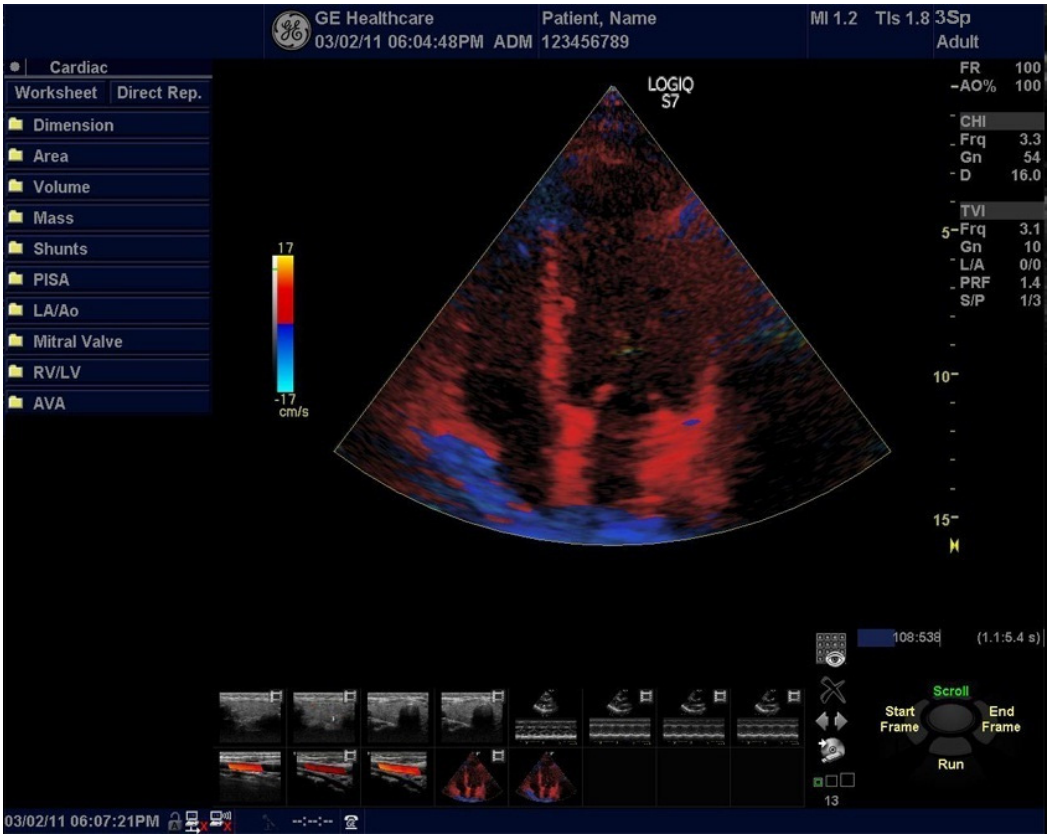



Figure 5-8. Tissue Velocity Imaging Display

### Activating TVI

1. Select the desired probe.
2. While in B-Mode, press the **TVI** key. The TVI image and the touch panel display.

   While in TVI, press **M** to activate TVM.

   While in TVI, press **PW** to activate TVD.
3. Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.
4. Use the trackball (assigned function: Size) to adjust the dimension of the ROI.

## Optimizing TVI

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the TVI display:

- To reduce quantification noise (variance), the Nyquist limit should be as low as possible, without creating aliasing. To reduce the Nyquist limit: Reduce the Scale value.

*NOTE: The Scale value also affects the frame rate. There is a trade off between the frame rate and quantification noise.*

- TVI provides velocity information only in the beam direction. The apical view typically provides the best window since the beams are then approximately aligned to the longitudinal direction of the myocardium (except near the apex). To obtain radial or circumferential tissue velocities, a parasternal view must be used. However, from this window the beam cannot be aligned to the muscle for all the parts of the ventricle.

*NOTE: PW will be optimized for Tissue Velocities when activated from inside TVI.*

*NOTE: You can preset the value on the Utility -> Imaging -> TVI or TVD mode and press **Save**.*

## TVI Parameters

You can preset all parameters in Utility -> Imaging ->TVI.

The TVI parameters function the same as those described in the Color Flow specific section. The only differences would be that it pertains to tissue velocity rather than the color flow image. In the table below any TVI parameter or parameter specifics are noted.

About optimizing other parameters, see ‘Optimizing Color Flow’ on *page 5-41* for details.

Table 5-1: TVI Parameters

| Control | Details |
|---|---|
| **Visible** | |
| Description | In LIVE/Freeze/Archive, you can display TVI Color with TVI. |
| Adjusting | Select ***Visible*** on the touch panel. |
| Values | On or Off. |
| **Line Density** | 0 or 1. Optimizes B-Mode frame rate or spatial resolution for the best possible image. |
| **Map** | Values: TV1 and TV2. |
| **Threshold** | High values display more color. Low values limit the color to lower tissue echo (Opposite of Threshold in Color Flow Mode). |
| **Spatial Filter** | Values 0, 1 and 2. |
| **TVI Gain** | Control color transparency. High values display more color; low values display more tissue. This parameter is assigned to the Color Gain control. |

## TVM Parameters

About optimizing other parameters, see ‘Optimizing M-Mode’ on *page 5-35 for more information*.

**Axial Filter**

| | |
|---|---|
| **Description** | Smooths out the color, makes it look less pixely. |
| **Adjusting** | Press left or right arrow key to select the value. |
| **Values** | 0 or 1. |
| **Benefits** | Smooths the image. |

## TVD Parameters

About optimizing other parameters, see ‘Optimizing Spectral Doppler’ on *page 5-88* for details.

## Quantitative Analysis (QAnalysis)

### Activating QAnalysis

1. Scan the patient in TVI or select a desired cine loop from the stored images.

*NOTE: Images from the current scan session acquired in TVI (already in CINE) or from a saved image loop can be used for QAnalysis.*

*NOTE: QAnalysis is only available if the user has selected an image loop. If the user has selected a saved still image (just one frame), QAnalysis is not available.*

2. Press **Freeze**.

*NOTE: QAnalysis is only available when the system is in CINE mode.*

3. ***QAnalysis*** displays on the Cine touch panel.
4. Select ***QAnalysis***. The QAnalysis screen and touch panel displays. To toggle the trackball function between QA and Scroll, press the top **Trackball** key.

### Q-Analysis Screen Description

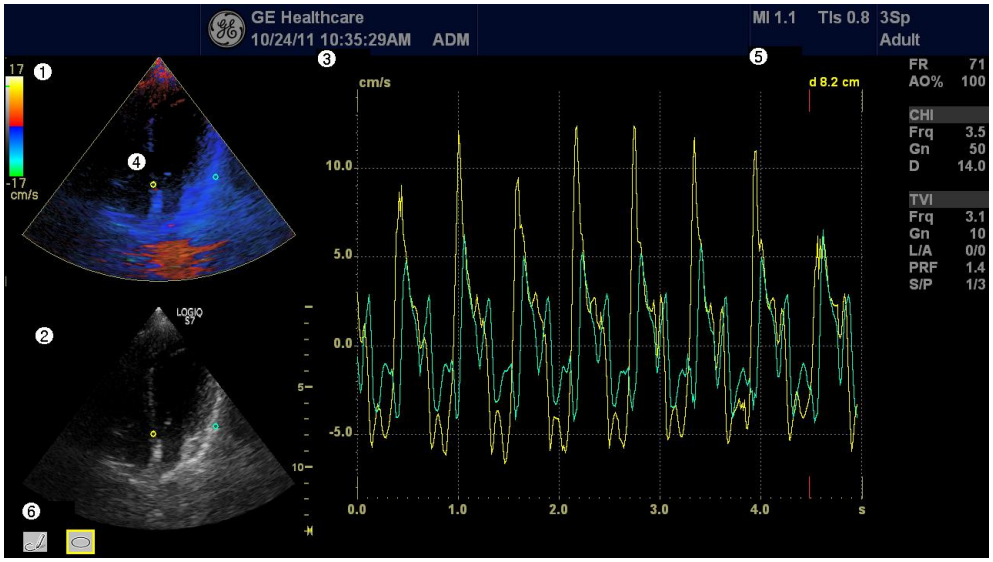



Figure 5-9. Q-Analysis Screen

Table 5-2: QAnalysis Screen Description

| | |
|---|---|
| 1. | TVI Cineloop Window<br>Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc. |
| 2. | B Cineloop Window<br>Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc. |
| 3. | Analysis Window.<br>• Y axis: Velocity scale (cm/s)<br>• X axis: Time(s)<br>• ECG<br>• Time at cursor position.<br>• Velocity at Cursor position.<br>• Velocity at frame marker position (Color coded) |
| 4. | Sample Area |
| 5. | Time at cursor position and velocity at cursor position. Position the pointer cursor over the analysis window. |

Table 5-2: QAnalysis Screen Description (Continued)

| | |
|---|---|
| 6. | Sample Area Tools.<br>• Pencil Icon: Creates a sample area based on freehand drawing.<br>• Shape Icon: Creates a sample area with a pre-defined circular/ellipse shape. |

### Display the System Menu

Place the cursor to the desired position and press the left ***Set*** key. The system menu displays at the cursor position.

The system menu is dependent on the area which you place the cursor.

- Analysis window
- Cineloop window
- ROI window
- Frame Marker

### Selecting QAnalysis Image Range

A range of frames is selected for the Qanalysis in Cine mode (before accessing QAnalysis). Only the frames in this range are used for the QAnalysis.

If a range is not selected prior to accessing the QAnalysis, the system uses the default Cine start and end frames as the default start and stop frames.

1. The first frame in the analysis series is selected by adjusting the ***Start Frame*** control to the desired frame

   OR

   using the **Trackball** or the ***Frame by Frame*** control to select the desired first frame and then selecting the ***Start Frame*** control.
2. The last frame in the analysis series is selected by adjusting the CINE ***Last Frame*** control to the desired frame

   OR

   using the **Trackball** or the ***Frame by Frame*** control to select the desired last frame and then selecting the ***Last Frame*** control.

### Generating a Trace

#### Trace from a pre-defined sample area

1. If the trackball assignment is not on QA, press the top **Trackball** key until QA highlights.
2. If necessary, select the sample area Ellipse ROI button (shape icon on the monitor display).
3. Move the cursor to one of the Cineloop windows using the **Trackball**.
4. Press **Set** to anchor the sample area.

   In this frame, the sample area is marked with an anchor. If the cineloop has more than one heart cycle, a sample area will also be anchored in the corresponding frame in the next heart cycle.

   The trace is updated accordingly in the Analysis window.

#### Trace from freehand sample area

1. Select the Freehand ROI button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
4. Press **Set** to anchor the sample area.

   The sample area is automatically closed and the trace is updated accordingly in the Analysis window.

**Manual tracking of the sample area (dynamic anchored sample area)**

1. Place a sample area over a region of interest. Note the anatomical location of the sample area.
2. Scroll to a new frame using the **Trackball**.
3. Press the top **Trackball** key until the QA trackball assignment is selected.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to the corresponding anatomical location in the new frame.

   When the sample area is anchored in more than one frame, linear interpolation is performed so that the sample area is smoothly moved between the anchored positions in the selected frames when running the cineloop.
7. Press the top **Trackball** key until the scroll trackball assignment is selected.
8. Using the **Trackball**, scroll through the cineloop and control that the sample area follows the moving anatomical structure.
9. Add anchored sample areas in several frames to obtain a more accurate displacement of the sample area.

**Moving a dynamic anchored sample area**

1. Press the top **Trackball** key until the scroll trackball assignment is selected.
2. Using the **Trackball**, browse thought the cineloop to display one of the frames where the sample area was anchored.

*NOTE: In these frames, the sample area is marked with an anchor.*

3. Press the top **Trackball** key until the QA trackball assignment is selected.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to a new location.
7. Press **Set** to anchor the sample area to the new location.

If you want to move the sample area to the same depth, select ***Move (same depth)*** from the System Menu.

**Delete a trace**

The user can delete all traces at once or one at a time.

1. If necessary, press the top Trackball key until the QA trackball assignment is selected.
2. Move the cursor over one of the sample area. Confirm that cursor is changed to hand icon.
3. Press the ***Delete Sample Area*** on the touch panel.
4. Select ***Current Sample*** or ***Delete all*** as necessary.

**Manipulating the Sample Area**

Up to eight ROIs can be saved on the reference image, with the corresponding eight traces plotted simultaneously on the graph. Each ROI display has a different color, and its corresponding trace data is plotted using that same color.

Once eight ROIs have been saved, the system does not automatically generate an active ROI when the cursor is positioned over the displayed reference image.

The saved ROIs can be a mixture of elliptical and freehand ROIs.

When the user repositions an ROI, the old trace data is erased from the plot and the trace data for the new position replotted.

If the ROI position on the last frame of the selected image range is moved, the corresponding ROIs on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate ROI positions on different frames of the contrast images, and the system shall linearly interpolate the ROI positions for the frames in between the selected frames.

### Setting the default sample area shape

1. Select ***Set sample area shape***. The Information Box displays.

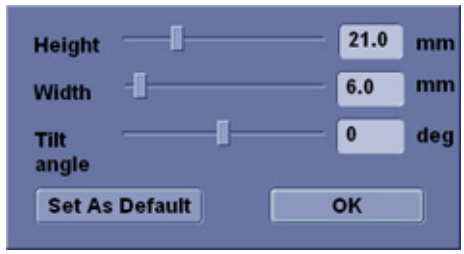



Figure 5-10. Sample Area Information Box

2. Select Height, Width and Tilt angle.
3. Select ***Set as default***. The current ROI size is set as the default for subsequent Ellipse ROIs.

### Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the ROI to reshape and press the left **Set** key.
2. The ROI system menu displays. Select ***Set sample area shape***.
3. Adjust Height, Width and Tilt angle.
4. Press ***OK***. The selected ROI size changes.

### Labeling a Sample Area

The sample area label is used to identify data associated with the sample area when exporting.

1. Position the cursor on the ROI to label and press the left **Set** key.
2. The ROI system menu displays. Select ***Label sample area***. The Label Dialog box displays.
3. Enter a name for the sample area.
4. Select ***OK***.

### Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

**Ellipse ROI**

1. Select the ellipse icon (shape icon on the monitor display).
2. When the trackball positions the image display cursor over the reference image(s), an elliptical ROI is automatically generated and displays on the reference image(s).
3. The average velocity value inside the ellipse is calculated for every image in the image analysis range and plotted in the image display area.
4. The last generated or selected ellipse is considered the active ROI, and its trace plot automatically updates as the user repositions it on the reference image. Old traces are erased.
5. When scanning with an elliptical ROI, press **Set** to fix the ROI position and freeze its corresponding trace on the plot. A new active ROI is generated whose position is manipulated by the trackball and whose velocity curve traces will be plotted as before, while the previous ROI and trace remain fixed at the points they were saved at.

*NOTE: Elliptical ROIs can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the ROI is outside the image boundary, only data from within the image boundary is used for calculating the mean velocity value.*

*NOTE: You can change the size of the Ellipse ROI by adjusting the Ellipse control.*

**Sample Area Shapes (continued)**

**Freehand ROI**

1. Select Freehand icon (pencil icon on the monitor display).

   Use the **Trackball** to position the caliper on the reference image at the start point. Press **Set** to fix the start point.
2. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
3. When a suitable ROI has been drawn, release the **Set** key.

   The caliper is then free for repositioning for another freehand ROI.

*NOTE: You cannot go outside the image boundary when drawing a freehand ROI.*

### Copy, move, and paste a Sample Area

To copy and paste the ROI,

1. Move the cursor over the ROI and press the left Set key. The system menu displays.
2. Select ***Copy sample area***.
3. Move the cursor to the desired location for the copied ROI and press the left Set Key. The system menu displays.
4. Select ***Paste sample area***.

To copy and move the ROI,

1. Move the cursor over the ROI and press the left Set key. The system menu displays.
2. Select ***Copy & move***. Or if you want to move to the same depth as the original ROI, select ***Copy & move (same depth)***.
3. Move the copied ROI using the **Trackball**. Press **Set** to fix the position.

### Deleting a Sample Area

Sample ROIs and their corresponding traces can be deleted using ***Delete Sample Area***.

1. Select ***Delete Sample Area***; a pull-down menu displays.
2. Select ***Current sample*** to delete the currently active ROI.

   Select ***Delete all*** to delete all currently set ROIs and all of their traces.

*NOTE: The corresponding traces for the deleted ROIs are erased from the plot.*

*NOTE: Deleting an ROI causes the ROIs to be deleted from all frames in the analysis loop.*

### QAnalysis Plot Control

The following controls are user configurable presets which are configurable through the pull-down menu in QAnalysis mode. When using the pull-down menu:

1. Place the cursor over the analysis window and press the left ***Set*** key. The system menu displays at the cursor position.
2. Select the appropriate parameter.

### To switch trace (Analysis Signal)

Analysis signal toggles trace display between Velocity, Displacement or Grayscale intensity curves.

1. Position the cursor over the plot window and select Analysis Signal from the pull-down menu.
2. Select ***Velocity***, ***Displacement*** or ***Grayscale Intensity*** as necessary.

### Vertical Unit

*NOTE: Vertical Unit is only available when Grayscale intensity is selected in Analysis Signal.*

When analyzing the data, the Y-axis can be set to display either logarithmic scale (dB) or linear, acoustic units (AU).

To toggle between dB and acoustical display units for the Y-axis.

- ***dB***—The traditional log compressed B-mode data is used to calculate the time-intensity curve values.
- ***Acoustic***—The system reverse the log compression function to provide un-log compressed data for the Qanalysis.

**Vertical auto-scaling**

The system can be configured to display the full unit range or a range according to the maximum and minimum values of the displayed trace(s) (auto-scaling function). In addition, the auto-scaling function can be set to be live update (updates while the sample area is moved) or delayed (updated when the sample area is anchored).

- ***Delayed***—The system automatically rescale the vertical axis of the trace graph only when a new ROI is saved, to account for changing input dynamic range.
- ***On***—The system automatically rescale the vertical axis of the trace graph every time the currently selected (active) ROI is moved.
- ***Off***—Disable any automatic scaling of the vertical axis. There is user-defined system defaults on the system preset page for the fixed vertical scale to be used for the plot.

**Line Style**

- ***Solid***—Setting the results in a plotted trace that does not display small boxes at the data points
- ***Squares***—Setting the results in a plot where small squares are displayed at each data point, and the squares are linked together by lines.

**Horizontal Sweep**

Horizontal Sweep allows you to increase or decrease the time interval over which to plot the analysis curve.

The Horizontal Sweep control can range from TBD on the short side to the time interval between the user selected first and last frame. The default is the user selected image range. If the user has not yet selected a first and last frame, the first and last default frames from the displayed CINE loop are used.

### Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter available is depending on the analysis signal displayed.

1. Select ***Smoothing***.

   OR

   Position the cursor over the analysis window and press the left ***Set key***. The System menu is displayed at the cursor position. Select ***Smoothing***.

*NOTE: When smoothing is turned on, it applies to all traces in the plot window.*

2. The smoothing filter list displays. Select the appropriate parameter.

### Drift Compensation

***Drift Compensation*** compensates drifting of Tissue Tracking curves by either resetting the curve to zero at the tracking start point (cycle resetting) or by linear compensation throughout the cycle (linear compensation).

*NOTE: When Displacement is chosen by AnalysisSignal, Drift Compensation is active.*

*NOTE: Drift Compensation is inactive if ECG data cannot be acquired.*

### Trace Measurements

### Gradient

Select Gradient entry on the pull-down menu that is obtained when the cursor is placed over the plot.

Gradient is displayed on the screen instead of velocity. The gradient calculates from 7 points (includes previous and next frames).

### Max Gradient

Displays the time and gradient that becomes the maximum gradient between the CINE start and end frame.

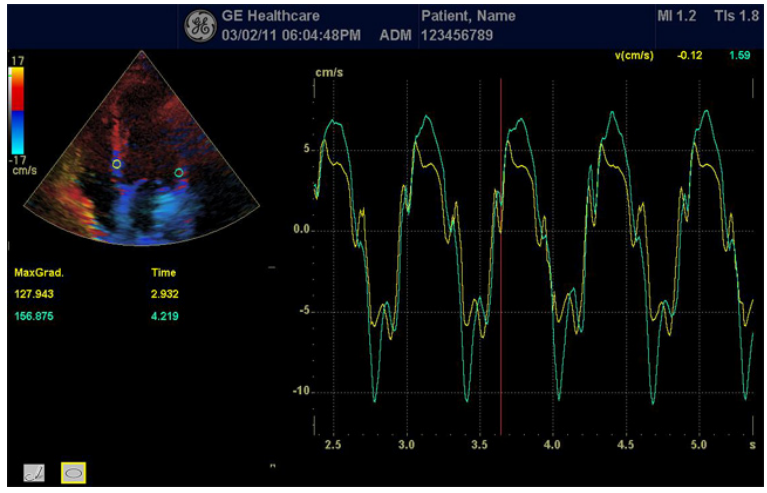



Figure 5-11. Max Gradient

**Zooming in the Analysis window**

To zoom:

1. In the Analysis window, press and hold down the **Set** key while dragging the cursor to define the zooming area.
2. Release the **Set** key.

To unzoom:

1. Press the left **Set** key in the Analysis window. The system menu displays.
2. Select ***Unzoom***.

*NOTE: Shown only in zoom mode.*

### Exporting Traces (Saving the Trace Data)

You can save the trace data to an external file.

1. Select ***Export Traces*** to save the trace data.
2. The following window displays.

Figure 5-12. Export Trace Window

- Location: Select Location which to save.
- Filename: Enter the filename. (Only Text)

3. Select ***OK*** to save the data and return to the QAnalysis screen.
   - All displayed ROI traces are saved in the exported file.

**Exporting Traces (Saving the Trace Data) (continued)**

All plot data (intensity, gradient and gradient derivative) are exported to a text file by “Export Trace”.

Table 5-3: Example of exported file

| Time(s): | Trace 1: | Trace 1 dGrad.: | Trace 1 dGrad. |
|---|---|---|---|
| 0.00000 | -3.97995e+000 | -2.15924e+001 | 8.05159e+001 |
| 0.03121 | -5.14631e+000 | -1.64719e+001 | 1.74256e+001 |
| 0.06242 | -5.75798e+000 | -1.27675e+001 | -7.78004e+001 |
| 0.09362 | -6.02222e+000 | -1.27675e+001 | -1.93426e+002 |
| 0.12483 | -6.11224e+000 | -1.44515e+001 | -4.17252e+002 |

*NOTE: The Smoothed trace is the one saved if the user has applied a smoothing filter.*

*NOTE: Only data from the user selected image range is included in the exported trace file.*

*NOTE: No trace results are saved in the standard image database.*

### Annotating the QAnalysis Data

The user can annotate both the reference image and the trace plot displays. Use **Comment** key to type the annotation. See Chapter 6 for reference.

### Printing QAnalysis Data

Press the appropriate print key in the desired analysis mode.

The system captures a single still frame which consists of the plot, the reference image, and user annotation.

### Exiting QAnalysis

There are several methods to exit QAnalysis.

- Toggling ***Exit QAnalysis*** on the QA touch panel.
- Press **Freeze** to unfreeze and resume scanning.
- Press any other button that returns the system to real-time scanning.

## Flow Quantification (Option)

Provide tools for semi-quantitative assessment of inflammation in joints and vascularization in tumors.

*NOTE: The frame number limitation for color quantification is 400 frames.*

### Activating Color Quantification

1. Scan the patient in the desired analysis mode or select a desired cine loop from the stored images.

*NOTE: Images from the current scan session acquired in the desired analysis mode (already in CINE) or from a saved image loop can be used for Quantification.*

*NOTE: Quantification is only available if the user has selected an image loop. If the user has selected a saved still image (just one frame), Quantification is not available.*

2. Press **Freeze**.

*NOTE: Quantification is only available when the system is in CINE mode.*

3. ***QAnalysis*** displays on the Cine touch panel.
4. Select ***QAnalysis***. The Quantification screen and touch panel displays. To toggle the trackball function between QA and Scroll, press the top **Trackball** key.

   Most Quantification procedures are the same as Tissue Velocity Imaging's QAnalysis. Refer to 'Quantitative Analysis (QAnalysis)' on *page 5-63*.

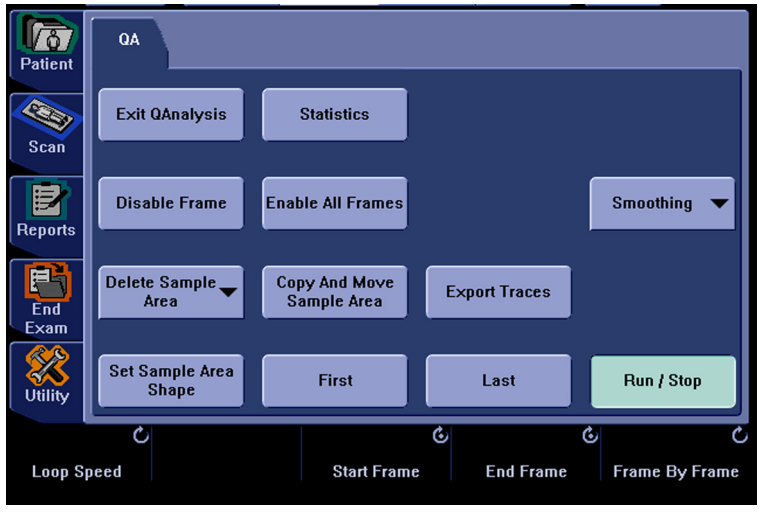



Figure 5-13. CF Quantification touch panel

### Statistics

The LOGIQ S7 Expert/Pro extracts various statistics from the image data within each ROI. The statistics depends on the imaging mode in use.

Press ***Statistics*** to enable/disable display of statistics of the frame or loop. The statistics are shown only when the loop is stopped.

- Ratio: Ratio of Color (Power) Doppler pixels over total ROI area.
- Area (mm2): The size of ROI
- Max Ratio/Time of Max Ratio: Maximum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.
- Min Ratio/Time of Min Ratio: Minimum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.

Quantification supports two different statistical display formats: Short Form and Long Form.

- Short Form: Ratio and Area.

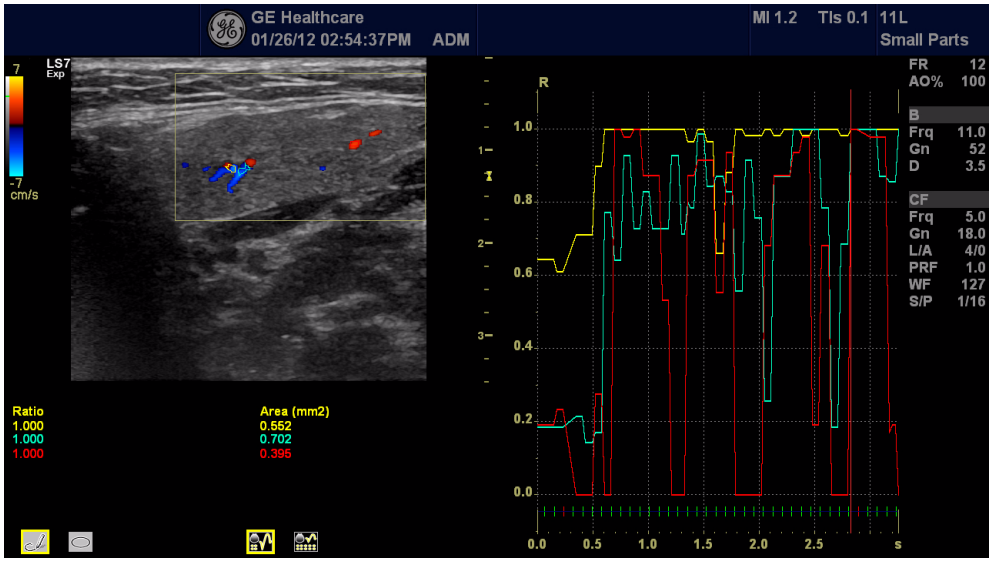



Figure 5-14. Color Flow Mode Short Form - Example

**Statistics (continued)**

- Long Form: Ratio, Area, Max Ratio/Time of Max Ratio, Min Ratio/Time of Min Ratio

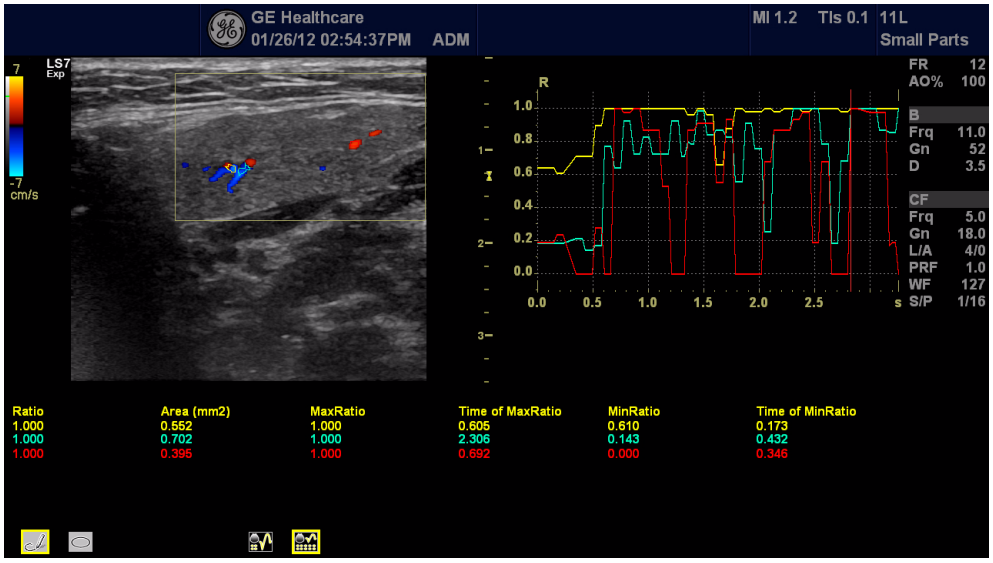



Figure 5-15. Color Flow Mode Long Form - Example

# Optimizing M Color Flow

## M Color Flow Mode

**Description**

M Color Flow is used for fetal cardiac applications. Color Flow overlays color on the M-Mode image using velocity and variance color maps. The Color Flow wedge overlays the B-Mode image and M-Mode timeline.

The Color Flow maps available in M-Mode are the same as in Color Flow Mode. The size and position of the Color Flow window in B-Mode determines the size and position of the Color Flow window in M-Mode.

All M-Mode measurements are available with M Color Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, enclosed area, distance, time, slope, and heart rate.

M Color Flow mode can be activated on the sector probes only.

## M Color Flow Mode (continued)

**Activating**

To activate M Color Flow Mode, press **M** (M-Mode). Then press **CF** (Color Flow) - or - press **CF**, then press **M**.

CM tab is displayed.

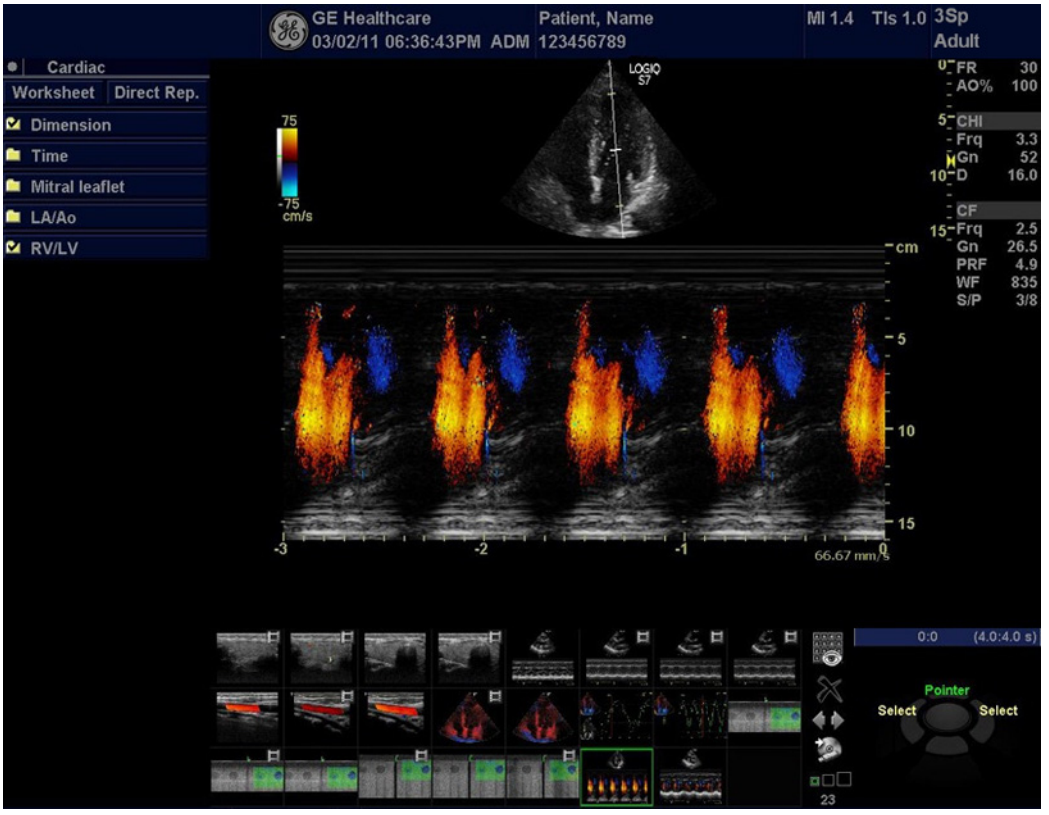



Figure 5-16. M Color Flow screen -- Representative Example

**Benefits**

Color Flow Mode and Color M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.

**Bioeffects**

Changing the Sweep Speed, Packet Size, Frame Rate/ Resolution, Zoom, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

# Optimizing Spectral Doppler

## Intended Use

Doppler is intended to provide measurement data concerning the velocity of moving tissues and fluids. PW Doppler lets you examine blood flow data selectively from a small region called the sample volume.

## Typical Use - PW Doppler

In Pulsed Wave Doppler (PW) Mode, energy is transmitted from the ultrasound probe into the patient, as in B-Mode. However, the received echoes are processed to extract the difference in frequency between the transmitted and received signals. Differences in frequencies can be caused by moving objects in the path of the ultrasound signal, such as moving blood cells. The resultant signals are presented audibly through the system speakers and graphically on the system display. The X axis of the graph represents time while the Y axis represents the shift in frequency. The Y axis can also be calibrated to represent velocity in either a forward or reverse direction.

PW Doppler is typically used for displaying the speed, direction, and spectral content of blood flow at selected anatomical sites. PW Doppler operates in two different modes: conventional PW and High Pulse Repetition Frequency (HPRF).

PW Doppler can be combined with B-Mode for rapidly selecting the anatomical site for PW Doppler examination. The site where PW Doppler data is derived appears graphically on the B-Mode image (Sample Volume Gate). The sample volume gate can be moved anywhere within the B-Mode image.

## Typical exam protocol

A typical examination using PW Doppler Mode might proceed as follows:

1. Connect the appropriate probe, leaving the probes in their respective holders.
2. Position the patient for the examination.
3. Press **Patient**. Enter the appropriate patient data using the appropriate exam category.
4. Select the preset, application and probe to be used.
5. Locate the anatomy to be examined. Get a good B Mode image. Press CF to help locate the vessel you wish to examine.
6. Press **Mode Cursor** to display the sample volume cursor and gate.

   or

   Press **PW**. The PW Doppler spectrum appears and the system operates in combined B+Doppler Mode. Adjust **Volume** to adjust Doppler audio. The Doppler signal is heard through the speakers.
7. Position the sample volume cursor by moving the **Trackball** left and right. Position the sample volume gate by moving the **Trackball** up and down. Size the gate by clicking **SV Length**.
8. Optimize the PW Doppler spectrum, as necessary. Refer to the *Doppler Optimization* section of this chapter for more information.

**Typical exam protocol (continued)**

9. Press **Update** to toggle between real time B-Mode with Doppler Mode (with audio).
10. Sample along the whole length of the vessel. Make sure that the probe is parallel to flow. Listen, then look, when positioning the sample volume cursor.
11. Press **Freeze** to hold the trace in memory and stop imaging. Activate CINE Timeline, as necessary. See ‘Activating CINE’ on *page 6-10 for more information.*
12. Perform measurements and calculations, as necessary. Refer to the Measurements and Calculations chapter for more information.
13. Record results by pressing the appropriate print key, depending on the setup of your recording devices.
14. Press **Freeze** to resume imaging.
15. Repeat the above procedure until all relevant flow sites have been examined.
16. Replace the probe in its respective holder.
17. To exit PW, press **PW**. To exit CW, press **CW**.

## Spectral Doppler Display

Time zero (the start of the trace) appears on the left side of the graph. As time progresses, the trace moves to the right. The baseline of the graph (representing zero velocity, zero frequency shift, or no detected flow), appears as a solid line running horizontally across the display. By convention, movement toward the probe is positive and movement away from the probe is negative. Positive frequencies or velocities appear above the baseline. Negative frequencies or velocities appear below the baseline.

Typically, blood flow is not uniform but is composed of a mix of blood cells moving at different velocities and in different directions. Thus, the display is composed of a spectrum as gray scale values. Strong signals are displayed as bright while weak signals are displayed as varying shades of gray.

HPRF (High Pulse Repetition Frequency) is invoked when you are operating in PW Doppler Mode and conditions activate HPRF (when the velocity scale factor or sample volume gate depth exceeds certain limits). When HPRF is active, multiple sample volume gates appear along the Doppler mode cursor. Doppler information can be received from any of the multiple sample volume gates. The Doppler signals from all the gates are added together and displayed in one spectrum.

Information about the PW Doppler display is automatically written on the screen and updated when scanning parameters are changed.

This chapter includes:

- A discussion of PW Doppler.
- Activating Pulsed Wave Doppler.
- Optimizing the Doppler spectrum.

## PW Doppler Mode Display

Figure 5-17. PW Doppler Mode Display -- Representative Example

Table 5-4: Doppler Mode Display Explanations

| Doppler Display | Description, Format, Values |
|---|---|
| PRF | Pulse repetition frequency, displayed as PRF in kHz. |
| Wall Filter | Wall filter size, displayed as WF in Hz. |
| Doppler Gain | Displays as GN in decibels (dB). |
| Sample Volume Depth | Displays (in Cm) when Doppler cursor is present. |
| Doppler Angle (AC ##) | Indicates angle in degrees between the Doppler mode cursor and the angle correction indicator. Displays when Doppler cursor is present. The Doppler Angle displays in red when the angle exceeds 60°. Velocities obtained when the angle is greater than 80° are displayed as asterisks (***). |

Table 5-4: Doppler Mode Display Explanations (Continued)

| Doppler Display | Description, Format, Values |
|---|---|
| Spectral Invert | INVERT appears when the spectral trace is inverted and the plus/minus signs (+/-) are reversed. |
| HPRF | HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale. |
| Time Scale | Each selection represents a different sweep time. |
| Angle Correct | Indicates flow direction. |
| Sample Volume Gate | Indicates sample volume box. Each probe defaults to a specific range gate. |
| Doppler Velocity Scale | Flow direction has a positive and negative indicator, noted in centimeters per second (cm/sec). When the velocity scale is less than 10 cm/s, it is displayed to the first decimal point (4.6 rather than 5 cm/s). The Doppler velocity scale adjust as you adjust the PRF. |

## Doppler Sample Volume Gate Position (Trackball)

**Description** Moves the sample volume gate on the B-Mode's Doppler Mode cursor. The gate is positioned over a specific position within the vessel.

**Adjusting** To move Doppler Mode cursor position, press the top trackball key to select ***Pos***, move **Trackball** left or right until positioned over the vessel.

To move sample volume gate position, press the top trackball key to select ***Pos***, move **Trackball** up or down until positioned inside the vessel.

**Values** Defaults to 50% of the depth and can move continuously throughout the field of view.

**Benefits** Positions the sample volume gate to sample blood flow.

**Bioeffects** Changing the sample volume gate position may change the TI and/or MI. Observe the output display for possible effects.

## Doppler Sample Volume Length

**Description** Sizes the sample volume gate.

**Adjusting** To increase/decrease the gate size, adjust ***SV Length*** on the touch panel. Hold down key to continuously size gate.

You can adjust the sample volume gate length whenever the sample volume gate appears on the display.

*NOTE: Adjustments to the sample volume gate size are made from the center point of the sample volume position.*

**Values** Values vary by probe and application.

Sample volume gate size values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** A smaller gate produces accurate sampling results because it is more sensitive. You can also enlarge the gate for sampling large vessels or areas.

**Bioeffects** Changing the sample volume gate size may change the TI and/or MI. Observe the output display for possible effects.

## Angle Correct/Auto Angle

**Description** Estimates the flow velocity in a direction at an angle to the Doppler vector by computing the angle between the Doppler vector and the flow to be measured.

*NOTE: When the Doppler Mode Cursor and angle correct indicator are aligned (the angle is 0), you cannot see the angle correct indicator.*

**Adjusting** Flow toward the probe is mapped above the baseline and vice versa.

To adjust the angle relative to the probe face, adjust ***Angle Correct*** to the left/right. The velocity scale changes when you adjust angle correct.

Press ***Angle Correct*** to access ***Auto Angle***.

*NOTE: Angle Correct can be adjusted in Triplex Mode when Update is activated.*

Angle Correct values vary by probe and application. Angle Correct values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Optimizes the accuracy of the flow velocity. This is especially useful in vascular applications where you need to measure velocity.

## Quick Angle

**Description** Quickly adjusts the angle by 60 degrees.

**Adjusting** Press ***Quick Angle*** to toggle between Off, Right and Left.

## Steer/Fine Steer

**Description**

You can slant the mode cursor of the linear image left or right to get more information without moving the probe. The angle steer function only applies to linear probes.

**Adjusting**

To slant the mode cursor to the left/right, adjust **Steer** to the left or right.

Press ***Steer*** to access ***Fine Steer***.

**Values**

Linear probes can be steered left (10, 15, 20 degrees), center, or right (10, 15, 20 degrees).

Steer values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

Fine Steer value can be changed in 2 degree increments.

**Benefits**

Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Vascular applications.

**Bioeffects**

Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

## Audio Volume

**Description** Controls audio output.

Audio sounds change rapidly, often abruptly. Increase the volume in small steps to avoid startling the patient.

**Benefits** An audio representation of the flow within a vessel can be used to evaluate proper probe angle and position.

## Auto Spectrum Optimize (Auto)

For details on Auto, See ‘Auto Optimize’ on *page 5-8 for more information.*

## Cycles to Average

**Description** The average value over a number of cycles (from 1-5). For example, if you set the number of cycles at 3, values would be averaged for 3 cycles. If you have 5 cycles on the display, the PS would be the average of 3 of the 5 cycles, which are identified by a line drawn over the 3 averaged cycles.

Available for live and frozen images.

## Display Format

**Description** Changes the horizontal/vertical layout between B-Mode and Doppler Mode or timeline only.

**Benefits** You can select how to have your Doppler timeline and anatomy displayed.

## Update

**Description** Toggles between simultaneous and update presentation while viewing the timeline.

**Adjusting** To activate, press **Update** to toggle between simultaneous and update. Doppler Mode does not restart each time the image is updated; however, a black bar may appear with a lightning bolt signalling a break in the timeline.

**Values** On/Off.

**Benefits** Update increases the Spectral Doppler display quality.

**Bioeffects** Activating Update may change the TI and/or MI. Observe the output display for possible effects.

## Simultaneous (Duplex/Triplex)

**Description** Duplex allows two modes to be active at the same time; Triplex allows three modes to be active at the same time.

- B + PW or B + CW or B + CF (Duplex)
- B + PW + CF or B + CW + CF (Triplex)

Update pauses the image while keeping the CW / PW timeline active.

When Duplex/Triplex is OFF, either the image or timeline is active. Update then switches the active side between the image and the timeline.

**Preset** You can preset Simultaneous in Utility --> Imaging --> General.

**Benefits** Allows the user to have multiple modes active at the same time.

## Baseline

**Description**

Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing.

**Adjusting**

Baseline adjusts the point in the spectrum where the velocity trace is at zero. The default baseline is at the midpoint of the spectrum.

The baseline displays as a solid line running across the spectrum. The baseline is raised and lowered in equal increments, depending on the current Doppler scale factor. The control does not wrap when the maximum baseline shift (in either direction) has been reached.

**Values**

50% is the center of the display, +95% is the top edge of the display and 5% is the bottom edge of the display. Baseline values vary by probe and application and are returned to the factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits**

Unwraps the alias. Rearranges the velocity scale without changing the velocity scale. Readjusts the positive and negative velocities limit without changing the total velocity range.

## Compression

**Description** Compression controls how echo intensities are converted to shades of gray, thereby increasing the range of contrast you can adjust.

**Values** The current value displays on the touch panel. Compression values vary by probe and application and are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

**Benefits** Optimizes the image's texture and smoothness by increasing or decreasing the amount of gray scale.

## Invert

**Description** Vertically inverts the spectral trace without affecting the baseline position.

The plus (+) and minus (-) signs on the velocity scale reverse when the spectrum is inverted.

Positive velocities display below the baseline.

**Values** Forward/reverse. The trace corresponds to flow direction (positive flow is forward flow toward the probe or negative flow is reverse flow away from the probe). The invert setting is returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient. In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.

**Benefits** If you change the probe angle to accommodate anatomy, blood flow still moves in the same direction, but the Doppler information will be reversed. It is easier in cases like this to invert the spectrum instead of reversing the probe orientation.

## Scale (Velocity Scale)

**Description**

Adjusts the velocity scale to accommodate faster/slower blood flow velocities. Velocity scale determines pulse repetition frequency.

If the sample volume gate range exceeds single gate Scale capability, the system automatically switches to high PRF mode. Multiple gates appear, and HPRF is indicated on the display.

**High PRF**

High Pulse Repetition Frequency (HPRF) is a special operating mode of PW Doppler. In HPRF mode, multiple energy pulses are used. This allows higher velocities to be detected without causing aliasing artifacts. HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale. The pulse repetition frequency (PRF) is displayed to the left of the spectrum in frames per second.

*NOTE: Ensure that only one gate overlays a blood vessel at a time. Otherwise, signals from more than one flow area are superimposed.*

**Adjusting**

To adjust the ***Scale***, turn the rotary. The display updates velocity scale parameters after you adjust the velocity scale.

**Values**

Velocity Scale values vary by probe and application. In Triplex, when you change the velocity scale in Color Flow, the Doppler Mode velocity scale is also updated if Triplex is on.

Velocity Scale values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

## Scale (Velocity Scale) (continued)

| | |
|---|---|
| **Benefits** | Blood flow information is not cut off due to the effect of aliasing. |
| **Affect on other controls** | When you raise the velocity scale, the spectral waveform may decrease in size; when you lower the velocity scale, the spectral waveform may increase in size. Changes in the spectrum are relative to changes in the velocity scale, that is, it sizes accordingly. When you adjust the velocity scale, CINE memory is cleared. Adjustments may affect sample volume size and Doppler wall filter. |
| **Bioeffects** | Changing the velocity range may change the TI and/or MI. Observe the output display for possible effects. |

## Wall Filter

| | |
|---|---|
| **Description** | Insulates the Doppler signal from excessive noise caused from vessel movement. |
| **Adjusting** | To increase/decrease, select ***Wall Filter*** on the touch panel. |
| **Values** | Values vary, depending upon the probe and application. The current value displays on the touch panel and the monitor. Wall Filter values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient. |
| **Benefits** | Gets rid of excess, unnecessary information. Cleans out low level noise above and below the baseline so you don't see or hear it on the spectrum. |
| **Affect on other controls** | Wall filter may be changed by changes to the velocity scale. |

## Trace Method

**Description** Traces the average mean and peak velocities in realtime or frozen images.

**Adjusting** To get a peak trace, click MAX. A green trace displays on the spectrum.

To get a mean trace, click MEAN. A blue trace displays on the spectrum.

**Benefits** Lets you trace the cardiac cycle.

## Trace Sensitivity

**Description** Adjust the trace to follow the waveform for signal strength.

**Benefits** If the signal is very faint, increasing the Trace Sensitivity will allow the system to trace that signal strength.

## Trace Direction

**Description** Specifies trace direction.

**Selecting Trace Position** You can select where on the waveform to perform the trace, above, below, or both (above and below).

## Cursor Moving

**Description** On Utility--> Imaging, specify No Action, Update 2D/CF-Long, Medium, or Short, or Update Doppler-Slow, Medium, or Fast.

Cursor Moving lets you ‘walk’ Doppler through a vessel while the Doppler gate is moving. Updates are more frequent on Fast vs. Medium vs. Slow. If you set the preset to Update 2/D/CF, this causes the B Mode/Color Flow image to go live while you move the Doppler cursor.

## CW Doppler - Continuous Wave Doppler (CWD) (Option)

There are two CW Doppler operating modes: Steerable and Non-Imaging.

Allows examination of blood flow data all along the Doppler Mode cursor rather than from any specific depth. Gather samples along the entire Doppler beam for rapid scanning of the heart. Range gated CW allows information to be gathered at higher velocities.

### Steerable

Allows viewing of the B-Mode image to position the Doppler cursor to the area of interest while viewing the Doppler spectrum (shown below in the B-Mode image) and listening to the Doppler Audio signal.

Works with the sector probes.

### Non-Imaging

Provides only Doppler Spectrum and Audio for ascending/ descending aortic arch, other hard-to-get-to spaces or higher velocities.

Works with the P2D and P6D probes.

## Activating CW Doppler

To activate CW Doppler Mode, press **CW**.

The Steerable CW Doppler spectrum displays along with the B-Mode image. The cursor changes to a Doppler cursor.

You can now position and size the sample volume gate to get a velocity. Use Doppler Audio to listen for when the sample volume gate is positioned over an area of flow.

***Update*** toggles between real time B-Mode with Doppler Mode and real time spectral display.

## Exiting CW Doppler

To exit CW Doppler Mode, press **CW**.

# Contrast Enhanced Ultrasound (Option)

## Overview

*NOTE: Please be advised that Contrast Enhanced Ultrasound MAY NOT BE available on your system. Contrast agents for radiology use are not yet available.*

Appropriate training

Only physicians or echo technicians who have received appropriate training can use the Contrast applications.

**Misdiagnosis based on image artifacts**

Misdiagnosis in ultrasound contrast images may be caused by several artifacts, most importantly:

Motion artifacts: gives rise to signals independently of contrast presence. This may be caused by patient movement; including respiration, or by probe movement influenced by the operator.

Regional drop outs: caused by unintentional destruction of the contrast agent, too low concentration of contrast agent, poor acoustic penetration due to rib/lung shadows or system failing to detect the contrast agent due to erroneous settings induced by the operator.

Tissue harmonics: gives contrast-like signals independently of the presence of contrast agent.

## Overview (continued)

CAUTION

Cardiac rhythm disturbances during perfusion studies using gas ultrasound contrast agents have been observed in the diagnostic range of Mechanical Index (MI) values. See the specific package insert for the contrast agent being used for details.

CAUTION

Read and follow contrast agent instructions provided by the manufacturer.

*NOTE: The LOGIQ S7 Expert/Pro is designed for compatibility with commercially available Ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast-related product features are enabled only on systems for delivery to an authorized country or region of use.*

## Overview (continued)

| | |
|---|---|
| | By adjusting the acoustic output, you can enhance either contrast harmonics or stimulated acoustic emission (SAE). |
| **Benefits** | Injected contrast agents re-emit incident acoustic energy at a harmonic frequency much more efficiently than the surrounding tissue. Blood containing the contrast agent stands out brightly against a dark background of normal tissue. |
| **Clinical Use** | Possible clinical uses are to detect and characterize tumors of the liver, kidney, and pancreas and to enhance flow signals in the determination of stenosis or thrombus. |
| **Affect on other controls** | The default acoustic output adjusts for Contrast Enhanced Ultrasound and the Power Output key provides more subtle gradations for use while in Contrast Enhanced Ultrasound. When you exit Contrast Enhanced Ultrasound, the system returns the acoustic output to its original setting. When you reactivate Contrast Enhanced Ultrasound, the system enters the default Contrast Mode.<br><br>Most system controls are available (Depth, Zoom, Colorize, etc.). However, some controls are not available (Anatomical M Mode and Rejection).<br><br>Controls adjusted while in Contrast Enhanced Ultrasound retain these values when you exit Contrast Enhanced Ultrasound (except for post-processing controls). |
| **Bioeffect** | Activating Contrast Enhanced Ultrasound may change the TI and/or MI. Observe the output display for possible effects. |
| **Feature Availability** | 3D is available; Multi Image and LOGIQView is not available. |
| **Probe** | Contrast is available on the C1-5-D probe. |

## Mode

### Reference Mode

Reference (Ref) Mode is to image the anatomical reference, not the contrast enhancement.

### Contrast Mode

There are several Contrast Enhanced Ultrasound techniques. Note that the appropriate imaging technique may vary by agent and application. In other words, the imaging technique is not dedicated for the agent and vice versa.

## Parameters

You can be preset almost controls in the Utility --> Imaging --> CON or Ref Tab.

### Contrast Tech.

**Description** Select the active contrast acquisition mode. “PI”, “AM”, and “CHA”

Table 5-5: Available Contrast Techniques

| Label | Description | Clinical Use |
|---|---|---|
| Coded PI (PI) | The main purpose of PI mode is to image the harmonic signal from the contrast agent. This mode transmits two consecutive pulses with inverted polarity as a contrast transmit group. The received signals are summed to cancel the fundamental (i.e. linear) responses and then the non-linear harmonic responses are extracted. | Harmonic - perfusion, tumor flow characteristics |
| Coded Harmonic Angio (CHA) | The main purpose of CHA mode is to image the non-linear signal from the contrast agent with strong tissue suppression. This mode transmits four consecutive pulses with alternate polarity (i.e. two pairs of Phase Inversion) as a contrast transmit group. | Vascular, early phase imaging |
| Amplitude Modulation (AM) | The main purpose of AM mode is to image the non-linear signal from the contrast agent. This mode transmits two or more consecutive pulses with the different amplitude as a contrast transmit group. The received signals are summed with the different coefficients to cancel the linear responses and then the non-linear responses are extracted. | Tumor detection and characterization |

*NOTE: The available options for the Contrast Tech. is depend on the supported contrast acquisition mode for the active probe.*

## Parameters (continued)

**Single View/Dual View**

**Description**

***Single View*** displays the active Contrast image only.

***Dual View*** displays the active Contrast image and the reference image simultaneously.

**Visualization**

**Description**

Define the display technique.

- **Contrast**. Displays the contrast-enhanced image.
- **Tissue**. Displays the tissue image.
- **Hybrid Contrast**. Displays the contrast-enhanced image and the tissue image using Hybrid Map.

**Visualization/Map Indication**

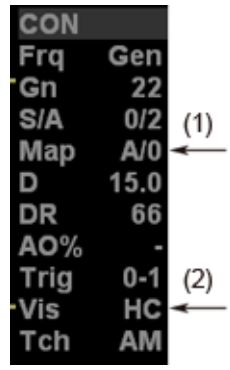



Figure 5-18. Imaging parameter

1. Gray/Colorize Map for current visualization.
2. Visualization: C=Contrast, T=Tissue, HC=Hybrid Contrast

## Parameters (continued)

**Hybrid Map**
**Description** Select the hybrid map for the Hybrid Contrast visualization in the Dual/Hybrid Display.

**Gray Map**
**Description** You can select a map for the contrast image and reference tissue image independently.

**Adjusting** Press ***Gray Map*** and select the map in each tab.

**Contrast Color**
**Description** Select the color map for the Contrast mode image.

**Adjusting** Press ***Colorize*** and select the map.

**Contrast only**
**Description** Only transmit and receive the acoustic power signal for the contrast-enhanced image.

**Adjusting** Press ***Contrast Only***.

## Parameters (continued)

**Frequency**

**Description** Select frequency type for each contrast technique.

**Adjusting** Frequency can be preset in the Utility -> Imaging -> CON.

- Frequency (AM): Res, Gen, Pen
- Frequency (PI): Gen, Pen
- Frequency (CHA): Gen

**Sonazoid**

**Description** If you use Sonazoid for Contrast agent, you have to check Sonazoid in Utility -> Imaging -> CON.

**Target MI**

**Description** Target MI Control provides the automated adjustment of the acoustic output to keep the specified target MI value to reduce the unexpected results on the contrast exam.

Target MI control can be preset in the Utility -> Imaging -> CON and Ref.

*NOTE: The value of Target MI for Reference Image is adjustable on Ref tab, only when Ref-Only mode.*

**Accumulation**

**Description** Accumulation enhances the flow in an image.

If Accumulation is turned off, then Frame Averaging is used; if Accumulation value is set, then Accumulation is used.

**Availability** Available in Contrast, Color Flow, PDI, and B-Flow.

**Benefit** Accumulation detects the maximum signal and holds it for the level specified.

## Parameters (continued)

**Max (Maximum) Enhance**

| | |
|---|---|
| **Description** | Sets the acoustic output to its maximum setting. |
| **Values** | On/Off. When you deactivate Max Enhance, the acoustic output is returned to its previous setting. Max Enhance is deactivated by the system when you turn it off, change probes, or change the contrast technique. |
| **Benefits** | This control provides quick transition to High MI imaging. This allows the user a quick one-button push to destroy the agent. Useful when the user is interested in the bubble wash-in characteristics of the anatomy being scanned. |

**Trigger**

| | |
|---|---|
| **Description** | The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify. |
| **Adjusting** | On/Off. Press **Trigger** assigned rotary. |

**Time Delay**

| | |
|---|---|
| **Description** | The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify. |
| **Adjusting** | Press **Trigger** to activate **Time Delay** (select the interval of the interval timer triggered acquisition). Move the rotary up/down to select the index.<br>Set the default seconds of Time Delay in Utility -> Imaging -> Con. |

## Parameters (continued)

**Flash**

**Description**

This feature provides a way to expose the higher acoustic power for a specified time duration by pressing a control once.

**Adjusting**

Press ***Flash***.

Set the frame numbers to scanned with the higher acoustic power in Utility--> Imaging--> Con--> Flash Frames. The frame numbers defined by Flash Frames are applied to both the Contrast Enhanced Ultrasound modes.

- If you select Flash once in the Con menus, the system scans with 100% acoustic output burst pulses for the specified number of frames. The acoustic output then reverts to the original settings.
- When Max Enhance is ON for the Contrast Enhanced Ultrasound modes, the system keeps Max Enhance = ON with no acoustic output change when Flash is selected in the Con menu.

### Contrast Clock (Timer)

**Description**

You can use the Contrast Clock by activating it at the time of injection and deactivating it at the end of the exam.

Two timers can be displayed on the bottom-left corner in image area and info area for several injection.

*NOTE: You can also configure the system to perform a countdown for the contrast injection with the Utility -> System -> System Imaging -> Countdown Time for Contrast preset.*

**Adjusting**

- Press ***Contrast Clock 1*** to start/stop the T1 timer.
- Press ***Contrast Clock 2*** to start/stop the T2 timer.

**Display**

There are two areas on the screen where the Contrast Clock displays: on the image and on the lower, left-hand portion of the display. The timer on the image freezes when you freeze the image (the timer updates when you unfreeze the image). However, the timer located on the lower, left-hand portion of the display continues to display over a freeze, probe change, mode change, multi image, and zoom.

The timer also appears on CINE Loops and archived images.

**Benefits**

The Contrast Clock measures the time since injection.

You can save the data of contrast clock to an external file by using Export Traces of TIC.

1. Press **Freeze**. Scroll with the Trackball to show Cine tab.
2. Press ***TIC Analysis*** on the touch panel to enter TIC application.
3. Put a ROI on the image.
4. Press Export Traces. Type the file name and store it to the storage device.

## Relationship with other controls

- L + R Simultaneous Display (L: Tissue, R: Active Visualization)
  - Accumulation/Cine Capture
    - Applied on the right side image only.
    - You cannot compare On and Off image using L + R.
  - SRI-HD
    - Applied on both side image.
  - Frame Average
    - Applied on both side image.
- TIC
  - Measured on active visualization, except “Hybrid Contrast”.
  - “Hybrid Contrast” is disabled and measured on “Contrast” visualization.
- Easy 3D
  - Build volume data from active visualization, except “Hybrid Contrast”.
  - Hybrid map is disabled and forces “Contrast” visualization.
- Archive
  - The raw data size increases between two to three times the size compared to the previous raw data. It takes a longer period of time to save as Cine.

## Time Intensity Curve (TIC) Analysis

The basic TIC process works as follows:

1. Scan the patient after injecting the contrast agent.
2. Watch the agent flow through the anatomy of interest.
3. When the desired contrast effect has been visualized, freeze the image and select a range of images for analysis.
4. Position an ROI (region of interest) on one of those images where the contrast effect is visible.
5. The system then calculates the mean pixel intensity within that ROI for all frames in the user designated loop and plots the resulting data as a function of time.

You can also choose to fit this data to one of several mathematical functions. The fundamental idea is that the contrast effect flowing through the organ of interest can be modeled mathematically, and details of the wash in and washout of the agent can be gleaned by analyzing the numerical parameters of the mathematical model.

## Activating TIC

1. Scan the patient in Contrast mode or select a desired cine loop from the stored images.

*NOTE: Images from the current scan session (already in CINE) or from a saved image loop can be used for TIC analysis.*

*NOTE: TIC analysis is only available if the user has selected an image loop. If the user has selected a saved still image (just one frame), TIC analysis is not available.*

2. Press **Freeze**.

*NOTE: The TIC package is only available when the system is in FREEZE mode.*

3. ***TIC Analysis*** displays on the Cine touch panel.

*NOTE: Subsequent TIC processing is done on the images stored in CINE memory.*

4. Select ***TIC Analysis***. The TIC Analysis screen and touch panel displays. To toggle the trackball function between TIC and Scroll, press top **Set** key.

Figure 5-19. TIC touch panel

## Activating TIC (continued)

Table 5-6: TIC touch panel Description

| Parameter | Description |
|---|---|
| Max Gradient | Between the CINE Start and End frame, displays the time and gradient that becomes the maximum gradient. |
| Accumulation | Enhances the flow in an image. |
| Disable Frame | The current frame is excluded from the CINE Loop display. |
| Enable All Frames | Re-enables disabled frames. |
| Horizontal Sweep | Allows you to increase/decrease the time interval over which to plot the TIC curve. |
| Smoothing | Smooths the trace displayed by applying a filter over a defined time window. Both the filter type and time window are user-selectable. The type of filter available depends on the analysis signal displayed. |
| Delete Sample Area | Removes selected sample area from the CINE Loop window and accompanying trace in the Analysis window. The Trackball marker must be pointed at an anchored sample area. |
| Export Trace | Saves trace data in ASCII format, readable in spreadsheet programs. If present, trace data for physiological traces are also exported. |
| Curve Fitting | Toggles between Wash-In, Wash-Out, and Off. |
| Set Sample Area Shape | Enables resizing of a selected sample area by setting height, width, and tilt angle. The Trackball marker must be pointed at an anchored sample area. |

*NOTE: The CINE touch panel is available to use when in TIC Analysis mode. CINE touch panel controls retain their traditional functions. While the CINE touch panel is on the top level, the Trackball and other imaging controls perform as they usually do in standard CINE mode.*

## Exiting TIC Analysis

There are several methods to exit TIC Analysis.

- Select ***Exit TIC Analysis*** on the TIC touch panel.
- Press **Freeze** to unfreeze and resume scanning.
- Press any other button that returns the system to real-time scanning.

## TIC Analysis Screen Description

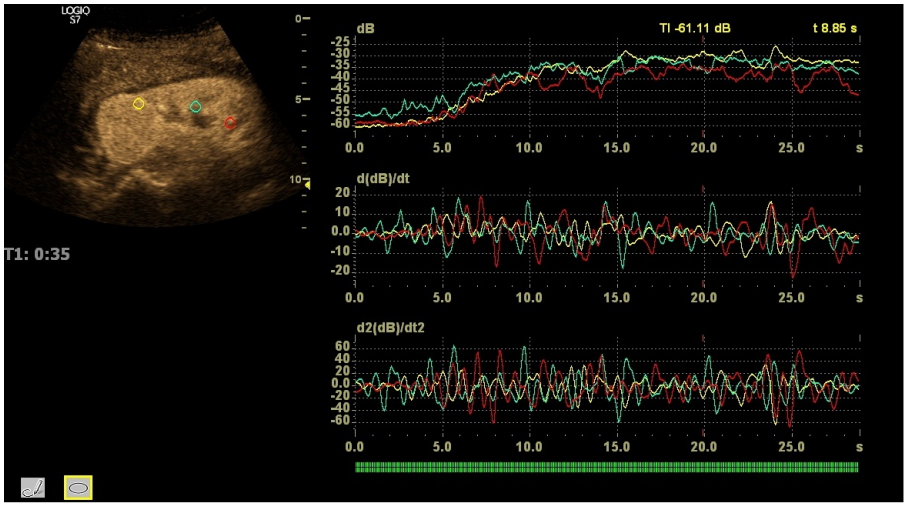



Figure 5-20. TIC Analysis Screen

Table 5-7: QAnalysis Screen Description

| | |
|---|---|
| 1. | Contrast Cineloop Window<br>Sample Area: Indicates sampling position of the intensity (contrast) trace. The sample area is color-coded: the first sample area is yellow, the second green, etc. |
| 2. | Displays time-intensity curve.<br>• Y axis: Intensity scale (logarithmic) (db) or linear acoustic units (AU).<br>• X axis: Time(s) or Dt(s), elapsed time from previous frame.<br>• ECG (where available -- not shown), Frame Marker: displays ECG trace (where available), the current frame marker and the start and stop markers for the cineloop.<br>• Time at cursor position and velocity at cursor position.<br>• Intensity (dB or AU) at cursor position.<br>• Intensity (dB or AU) at frame marker position (color coded) |
| 3. | Sample Area Tools.<br>• Pencil Icon: Creates a sample area based on freehand drawing.<br>• Shape Icon: Creates a sample area with a pre-defined circular/ellipse shape. |

## System Menu

The System menu on the monitor display can be used instead of the touch panel.

### Analysis Window System Menu

Position the cursor over the analysis window and press the left ***Set*** key. The Analysis Window system menu displays at the cursor position.

*NOTE: The system menu is dependent on mode.*

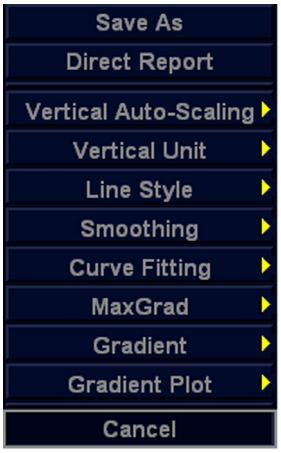



Figure 5-21. Analysis Window System Menu - example

### ROI System Menu

Position the cursor on the ROI and press the left ***Set*** key. The ROI system menu displays at the cursor position.

Figure 5-22. ROI System Menu

### Frame Marker System Menu

Position the cursor on the Frame Marker in the Analysis Window and press the left ***Set*** key. The Frame Marker system menu displays at the cursor position.

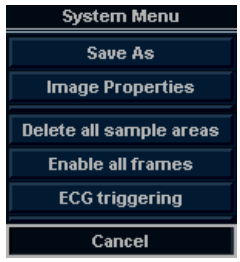



Figure 5-23. Frame Marker System Menu

### Selecting TIC Analysis Image Range

A range of frames is selected for the TIC analysis in Cine mode (before accessing TIC Analysis). Only the frames in this range are used for the TIC analysis.

If a range is not selected prior to accessing the TIC Analysis, the system uses the default Cine start and end frames as the default TIC start and stop frames.

1. The first frame in the analysis series is selected by adjusting the ***Start Frame*** control to the desired frame

   OR

   using the **Trackball** or the ***Frame by Frame*** control to select the desired first frame and then selecting the ***Start Frame*** control.
2. The last frame in the analysis series is selected by adjusting the CINE ***Last Frame*** control to the desired frame

   OR

   using the **Trackball** or the ***Frame by Frame*** control to select the desired last frame and then selecting the ***Last Frame*** control.

## Generating a Trace

Up to eight traces can be generated.

### About the sample area

The sample area can be in three different states:

- **Free sample area**: freely moving sample area (QA cursor) before anchoring.

*NOTE: The free sample area disappears when the QA cursor is moved over a static anchored frame.*

- **Static sample area**: the free sample area is anchored by pressing Set.
- **Dynamic anchored sample area**: the sample area is anchored in two or more frames (see Manual tracking below). In these particular frames, the sample area is displayed with an anchor. The sample area moves smoothly between the anchored positions when playing/scrolling the cineloop.

### Trace from a pre-defined sample area

1. Press the top **Trackball** key until the QA trackball assignment is selected.
2. If necessary, select the sample area Ellipse ROI button (shape icon on the monitor display).
3. Move the cursor to one of the Cineloop windows using the **Trackball**.

   The cursor is changed to a sample area (white circle). A preview of the trace is displayed in the Analysis window.
4. Press **Set** to anchor the sample area.

   In this frame, the sample area is marked with an anchor. If the cineloop has more than one heart cycle, a sample area will also be anchored in the corresponding frame in the next heart cycle.

   The trace is updated accordingly in the Analysis window.

## Generating a Trace (continued)

### Trace from freehand sample area

1. Select the Freehand ROI button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
4. Press **Set** to anchor the sample area.

   The sample area is automatically closed and the trace is updated accordingly in the Analysis window.

### Manual tracking of the sample area (dynamic anchored sample area)

The sample area can be moved within the loop to ensure that data in the trace is generated from the same anatomical location during the cyclic motion of the heart.

1. Place a sample area over a region of interest. Note the anatomical location of the sample area.
2. Scroll to a new frame using the **Trackball**.
3. Press the top **Trackball** key until the QA trackball assignment is selected.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to the corresponding anatomical location in the new frame.

   When the sample area is anchored in more than one frame, linear interpolation is performed so that the sample area is smoothly moved between the anchored positions in the selected frames when running the cineloop.

*NOTE:* *In the original frame and this particular frame the sample area is marked with an anchor.*

7. Press the top **Trackball** key until the scroll trackball assignment is selected.
8. Using the **Trackball**, scroll through the cineloop and control that the sample area follows the moving anatomical structure.
9. Add anchored sample areas in several frames to obtain a more accurate displacement of the sample area.

## Manual tracking of the sample area (dynamic anchored sample area) (continued)

### Moving a dynamic anchored sample area

1. Freeze the image.
2. Press top Trackball key until the scroll trackball assignment is selected.
3. Using the **Trackball**, browse through the cineloop to display one of the frames where the sample area was anchored.

*NOTE: In these frames, the sample area is marked with an anchor.*

4. Press top Trackball key until the QA trackball assignment is selected.
5. Move the cursor to the sample area using the **Trackball**.
6. Press **Set**. The sample area is unanchored.
7. Drag the sample area to a new location.
8. Press **Set** to anchor the sample area to the new location.

If you want to move the sample area to the same depth, select ***Move (same depth)*** from the System Menu.

### Zooming in the Analysis window

To zoom:

1. In the Analysis window, press and hold down the **Set** key while dragging the cursor to define the zooming area.
2. Release the **Set** key.

To unzoom:

1. Press the left **Set** key in the Analysis window. The system menu displays.
2. Select ***Unzoom***.

*NOTE: Shown only in zoom mode.*

### Delete a trace

The user can delete all traces at once or one at a time.

1. If necessary, press the top Trackball key until the QA trackball assignment is selected.
2. Move the cursor over one of the sample area. Confirm that cursor is changed to hand icon.
3. Press the ***Delete Sample Area*** on the touch panel.
4. Select ***Current Sample*** or ***Delete all*** as necessary.

## Disabling/Enabling the frame

Frame disabling excludes the actual frame from the cineloop display. Frame disabling is available only with contrast data.

### Disabling the frame from the frame marker

To disable One Frame :

1. Use the **Trackball** to move the cursor to the frame maker to disable.
2. Press **Set** to disable the frame.
3. The frame marker is changed from green to red to indicate the frame has been disabled.

*NOTE: The disabled frame is no longer displayed in the reference window when scrolling through CINE memory.*

### Disabling multi-frames from the frame marker

1. Use the Trackball to move the cursor to the first frame maker to disable.
2. Press and hold down ***Set***
3. Move the cursor with the Trackball to the last frame to be disabled and release Set.

   The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

## Disabling/Enabling the frame (continued)

### Disabling a frame from the cineloop window

1. Use the Trackball to move the cursor to the cineloop window.
2. Press the left ***Set*** key. The system menu displays.
3. Select ***Disable frame***.

   The current frame is disabled and the corresponding frame marker displays red.

### Disabling ECG triggered frame (where available)

In a multi-cycle acquisition, the user may deselect all frames in all heart cycles but a selected one. This function can be used for example to select a particular systolic frame for each heart cycle.

1. Scroll through the cineloop to identify the cardiac phase to analyze or identify the cardiac phase on the ECG trace (where available).
2. Position the cursor on the ECG trace (where available) and press left **Set** key. The system menu displays.
3. Select ***ECG triggering*** (where available).

   All frames in all heart cycles are disabled except for the selected and corresponding frames in the other heart cycles.

## Disabling/Enabling the frame (continued)

### To enable the frames

To re-enable all deleted frames :

1. Position the cursor on the Frame Marker line and press the left ***Set*** key. The system menu is displayed at the cursor position.
2. Select ***Enable all frames***.
3. All disabled frames are re-enabled.

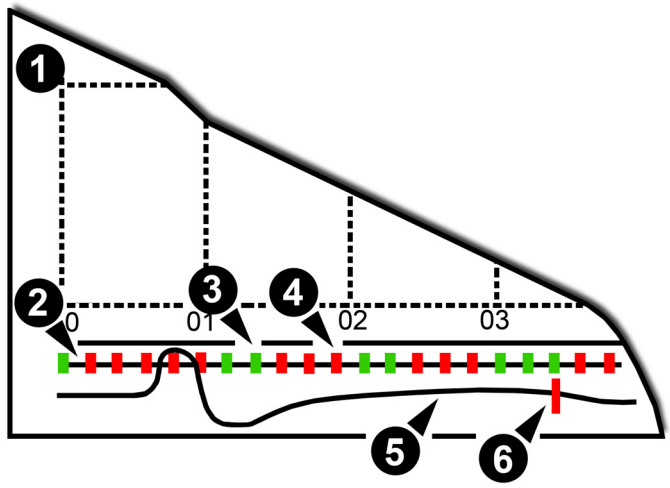



Figure 5-24. Frame markers

1. Analysis Window
2. Frame markers axis
3. Enabled frame (Green)
4. Disabled frame (Red)
5. ECG (where available)
6. Current frame

### Manipulating the Sample Area

Up to eight ROIs can be saved on the reference image, with the corresponding eight traces plotted simultaneously on the graph. Each ROI display has a different color, and its corresponding trace data is plotted using that same color.

Once eight ROIs have been saved, the system does not automatically generate an active ROI when the cursor is positioned over the displayed reference image.

The saved ROIs can be a mixture of elliptical and freehand ROIs.

When the user repositions an ROI, the old trace data is erased from the plot and the trace data for the new position replotted.

If the ROI position on the last frame of the selected image range is moved, the corresponding ROIs on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate ROI positions on different frames of the contrast images, and the system shall linearly interpolate the ROI positions for the frames in between the selected frames.

## Manipulating the Sample Area (continued)

### Setting the sample area shape

1. Select ***Set sample area shape***. The Information Box displays.

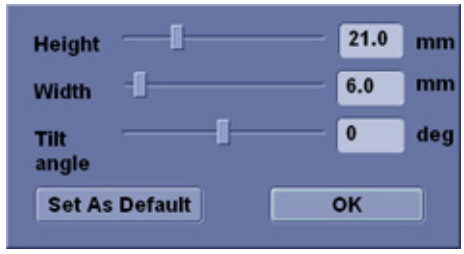



Figure 5-25. Sample Area Information Box

2. Select Height, Width and Tilt angle.
3. Select ***Set as default***. The current ROI size is set as the default for subsequent Ellipse ROIs.

### Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the ROI to reshape and press the left **Set** key.
2. The ROI system menu displays. Select ***Set sample area shape***.
3. Adjust Height, Width and Tilt angle.
4. Press ***OK***. The selected ROI size changes.

### Labeling a Sample Area

The sample area label is used to identify data associated with the sample area when exporting.

1. Position the cursor on the ROI to label and press the left **Set** key.
2. The ROI system menu displays. Select ***Label sample area***. The Label Dialog box displays.
3. Enter a name for the sample area.
4. Select ***OK***.

## Manipulating the Sample Area (continued)

### Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

**Ellipse ROI**

1. Select the ellipse icon (shape icon on the monitor display).
2. When the trackball positions the image display cursor over the reference image(s), an elliptical ROI is automatically generated and displays on the reference image(s).
3. The average intensity value inside the ellipse is calculated for every image in the image analysis range and plotted in the image display area.
4. The last generated or selected ellipse is considered the active ROI, and its trace plot automatically updates as the user repositions it on the reference image. Old traces are erased.
5. When scanning with an elliptical ROI, press **Set** to fix the ROI position and freeze its corresponding trace on the plot. A new active ROI is generated whose position is manipulated by the trackball and whose time-intensity curve traces will be plotted as before, while the previous ROI and trace remain fixed at the points they were saved at.

*NOTE: Elliptical ROIs can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the ROI is outside the image boundary, only data from within the image boundary is used for calculating the mean intensity value.*

*NOTE: You can change the size of the Ellipse ROI by adjusting the Ellipse control.*

**Sample Area Shapes (continued)**

**Freehand ROI**

1. Select Freehand icon (pencil icon on the monitor display).

   Use the **Trackball** to position the caliper on the reference image at the start point. Press **Set** to fix the start point.
2. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
3. When a suitable ROI has been drawn, press **Set** a second time.

   The system automatically links the start point to the end point by drawing a straight line between them. The caliper is then free for repositioning for another freehand ROI.

*NOTE: You cannot go outside the image boundary when drawing a freehand ROI.*

## Manipulating the Sample Area (continued)

### Copy, move, and paste a Sample Area

To copy and paste the ROI,

1. Move the cursor over the ROI and press the left **Set** key. The system menu displays.
2. Select ***Copy sample area***.
3. Move the cursor to the desired location for the copied ROI and press the left **Set** Key. The system menu displays.
4. Select ***Paste sample area***.

To copy and move the ROI,

1. Move the cursor over the ROI and press the left **Set** key. The system menu displays.
2. Select ***Copy & move***. Or if you want to move to the same depth as the original ROI, select ***Copy & move (same depth)***.
3. Move the copied ROI using the **Trackball**. Press **Set** to fix the position.

### Deleting a Sample Area

Sample ROIs and their corresponding traces can be deleted using ***Delete Sample Area***.

1. Select ***Delete Sample Area***; a pull-down menu displays.
2. Select ***Current sample*** to delete the currently active ROI.

   Select ***Delete all*** to delete all currently set ROIs and all of their traces.

*NOTE: The corresponding traces for the deleted ROIs are erased from the plot.*

*NOTE: Deleting an ROI causes the ROIs to be deleted from all frames in the analysis loop.*

## TIC Plot Control

The following controls are user configurable presets which are configurable via the Utility Menu or through the pull-down menu in TIC Analysis mode. When using the pull-down menu:

1. Position the cursor over the analysis window and press the left **Set** key. The system menu displays at the cursor position.
2. Select the appropriate parameter.

### Vertical Unit

When analyzing the contrast data, the Y-axis can be set to display either longarithmic scale (dB) or linear, acoustic units (AU) for both tissue intensity (2D) or Angio intensity data.

To toggle between dB and acoustical display units for the Y-axis.

- ***dB***—The traditional log compressed B-mode data is used to calculate the time-intensity curve values.
- ***Acoustic***—The system reverse the log compression function to provide un-log compressed data for the TIC analysis.

Figure 5-26. Vertical Unit Pop-up menu

## TIC Plot Control (continued)

### Vertical auto-scaling

The system can be configured to display the full unit range or a range according to the maximum and minimum values of the displayed trace(s) (auto-scaling function). In addition, the auto-scaling function can be set to be live update (updates while the sample area is moved) or delayed (updated when the sample area is anchored).

- ***Delayed***—The system automatically rescale the vertical axis of the trace graph only when a new ROI is saved, to account for changing input dynamic range.
- ***On***—The system automatically rescale the vertical axis of the trace graph every time the currently selected (active) ROI is moved.
- ***Off***—Disable any automatic scaling of the vertical axis. There is user-defined system defaults on the system preset page for the fixed vertical scale to be used for the plot.

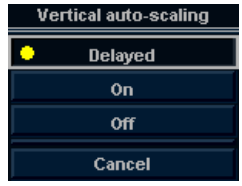



Figure 5-27. Vertical Autoscale Pop-up menu

### Line Style

- ***Solid***—Setting the results in a plotted trace that does not display small boxes at the data points
- ***Squares***—Setting the results in a plot where small squares are displayed at each data point, and the squares are linked together by lines.

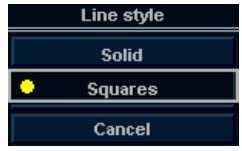



Figure 5-28. Line style Pop-up menu

## TIC Plot Control (continued)

### Horizontal Scale

Set the horizontal unit as time scaling (s) or time interval (dt) between frames.

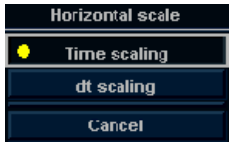



Figure 5-29. Horizontal Scale Pop-up menu

*NOTE: The Horizontal Scale menu displays for CHA and Phase Inversion.*

### Horizontal Sweep

Horizontal Sweep allows you to increase or decrease the time interval over which to plot the TIC curve.

The Horizontal Sweep control can range from TBD on the short side to the time interval between the user selected first and last frame. The default is the user selected image range. If the user has not yet selected a first and last frame, the first and last default frames from the displayed CINE loop are used.

## TIC Plot Control (continued)

### Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter availabe is depending on the analysis signal displayed.

1. Select ***Smoothing***.

   OR

   Position the cursor over the analysis window and press the left ***Set key***. The System menu is displayed at the cursor position. Select ***Smoothing***.

*NOTE: When smoothing is turned on, it applies to all traces in the plot window.*

2. The smoothing filter list displays. Select the appropriate parameter.

*NOTE: If 'dt' is selected for Horizontal Scale, you cannot use Smoothing.*

## Trace Measurement

### Gradient

Gradient is displayed on the screen instead of Intensity (db or AU). The gradient calculates from 7 points (includes previous and next frames).

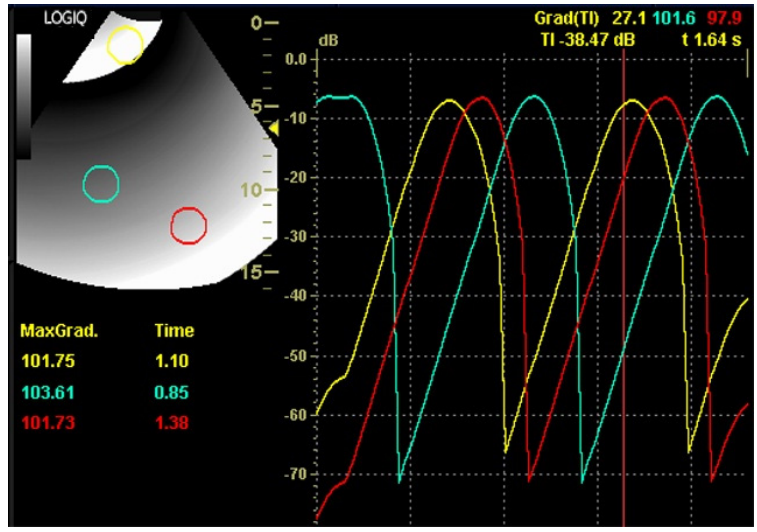



Figure 5-30. Gradient

## Trace Measurement (continued)

### Max Gradient

Displays the time and gradient that becomes the maximum gradient between the CINE start and end frame.

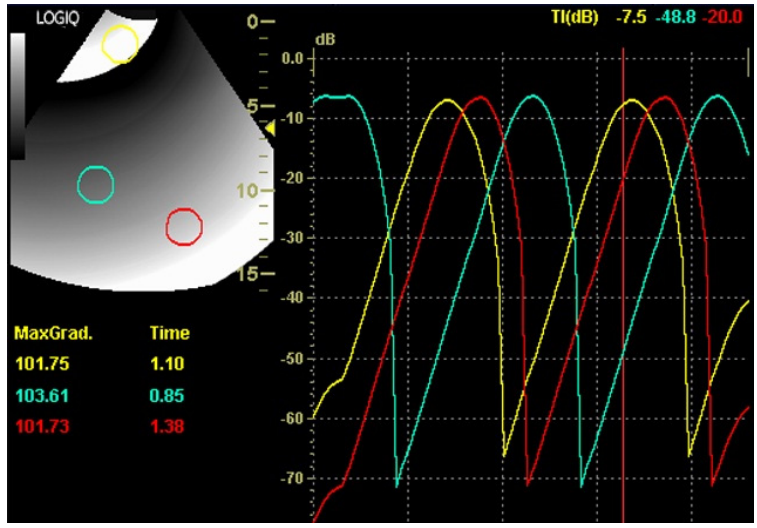



Figure 5-31. Max Gradient

## Trace Measurement (continued)

### Show graph (Gradient plot)

1. Gradient Plot displays on the TIC system menu.

Figure 5-32. System Menu

**Show graph (Gradient plot) (continued)**

2. Select the parameter.

   - Off: A graph plots TIC.
   - Gradient: Two graphs plot TIC and TIC gradient.

     - Unit of Y-axis is dB or AU in case of intensity.

     - The unit is d(db)/dt or d(AU)/dt in case of the intensity gradient.

     - Gradient values for the current frame are displayed in the upper right corner of the graph.

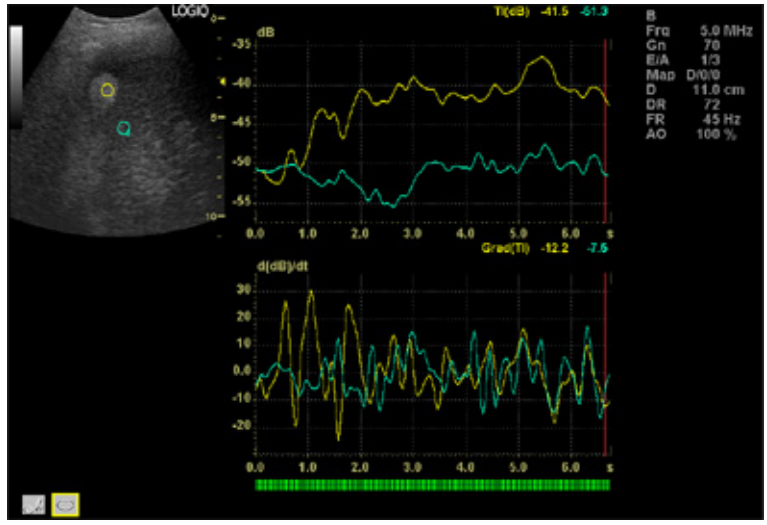



Figure 5-33. Gradient

**Show graph (Gradient plot) (continued)**

- Gradient Derivative: Two graphs plot TIC and TIC gradient derivative.

  - The Y-axis units is d2(dB)/dt2 or d2(AU)/dts in case of the intensity gradient derivative.

  - Gradient derivative values for the current frame are displayed in the upper right corner of the graph.

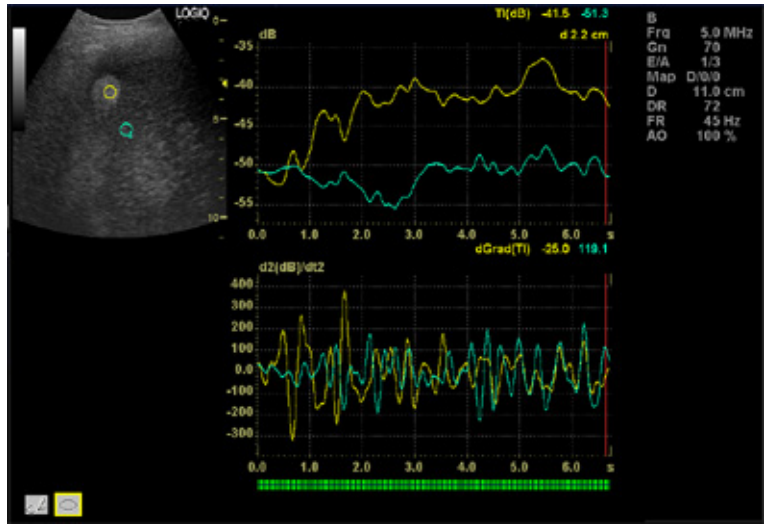



Figure 5-34. Gradient derivative

**Show graph (Gradient plot) (continued)**

- All: Three graphs plot TIC, TIC gradient and TIC gradient derivative.

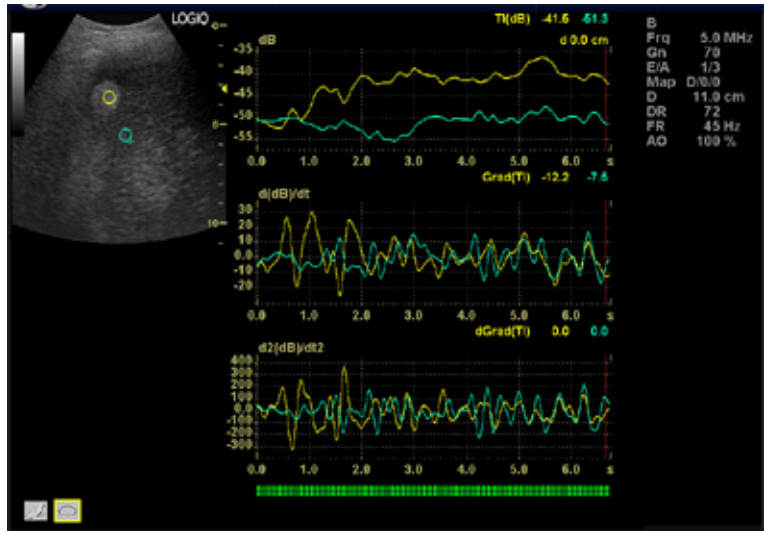



Figure 5-35. All

**Curve Fit**

1. Select ***Curve Fit***.

   OR

   Position the cursor over the analysis window and press the left ***Set*** key. The system menu displays at the cursor position. Select ***Curve Fit***.
2. The Curve Fit selection list displays.

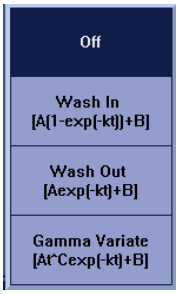



Figure 5-36. Curve Fit Selection List

- ***Off***—Remove the fitted curves from the plot and the fit parameters from the display.
- ***Wash-in***—Used to find and estimate the local perfusion rate using the contrast agent. Expotential wash-in is described by the function:

  Y(t) = A(1-exp(-kt))+B, where:

  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity at time t=0 (defined as the time of the left marker). This corresponds to the tissue (baseline) signal if no contrast is present at the selected starting point.

*NOTE:* *A + B = contrast + tissue = plateau level.*

  - k (1/s) is a time constant.

**Curve Fit (continued)**

- ***Wash-out***—Used to find and estimate a local wash-out rate. Expotential wash-out is described by the function:

  Y(t) = Aexp(-kt)+B, where :

  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity from the tissue = baseline signal.

  *NOTE: A + B is the initial intensity level.*

  - k (1/s) is a time constant.

- ***Gamma variate***

  $Y(t) = At^{c}exp(-kt)+B$

**Curve Fit (continued)**

**Parameters of Gamma curve fitting**

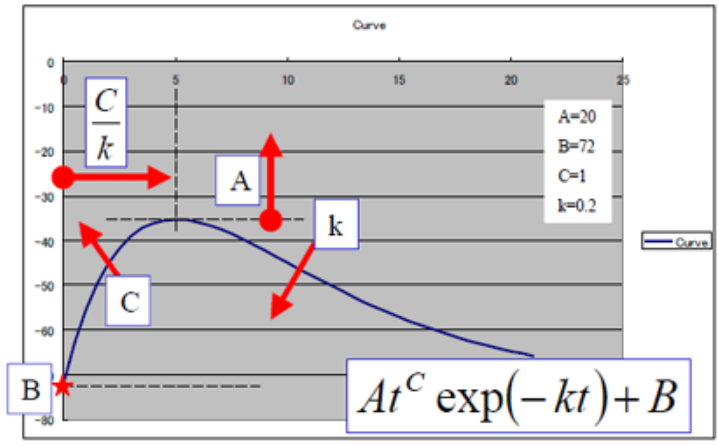



Figure 5-37. Gamma Curve

- $t^C$: Increasing function (C>0) for “Wash-in”.
  For larger C, the intensity increases quickly before the peak.
- exp(-kt): Decreasing function (k>0) for “Wash-out”.
  For larger k, the intensity decreases quickly after the peak.
- B: Intercept intensity at t=0.
- The peak intensity of the curve is affected by all parameters.
  Larger A, larger B, larger C, and smaller k make larger peak. The peak time is calculated by C/k.
- MSE: Mean Square Error
  If the MSE is small, the difference of actual data and the fitted curve is small.

**Set Start/End Frame for Curve Fit per ROI position**

1. Generate TIC and perform a Curve Fit.

   In this state, the Curve Fit graph is drawn from Cine Start Frame to Cine End Frame for all the ROIs.

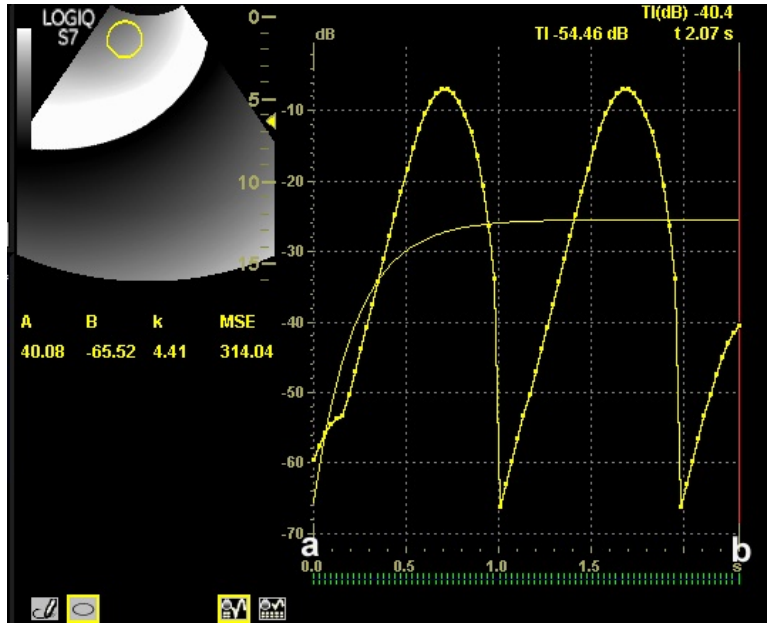



Figure 5-38. Curve Fit screen

   a. Cine Start Frame
   b. Cine End Frame

2. Select the Start Frame as with Cine or move the cursor to the desired position on the graph and select the right **Set** key.

**Set Start/End Frame for Curve Fit per ROI position (continued)**

3. Move the arrow pointer on the ROI (hand cursor appears) and select the unmarked key (opposite the **Set** key). The system menu appears.
4. Select ***Set curve fit start frame*** from the menu.
5. Select the End Frame as with Cine or move the cursor to the desired position on the graph and select the right **Set** key.
6. Move the arrow pointer on the ROI (hand cursor appears) and select the unmarked key (opposite the **Set** key). The system menu appears.
7. Select ***Set curve fit end frame*** from the menu. The ROI colored line displays.

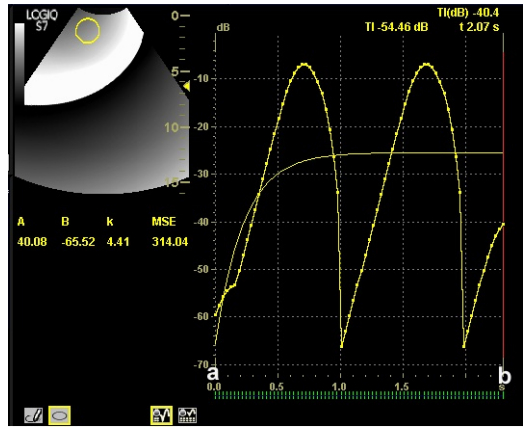



Figure 5-39. New Start Frame and End Frame (Example)

a. Start Frame
b. End Frame

8. Repeat the above procedures as necessary.

   The system retains the start/end frame per ROI while TIC is active. Once the TIC menu is closed, the settings are lost.

### Display/Hide Calculation Values

You can specify Time to Peak, Area under the curve, Curve gradient, and Arrival time values for Wash-in, Wash-out, and Gamma Variate curve fitting values.

1. Select ***Curve Fitting Parameters*** on the touch panel. The Curve Fitting Parameters dialog appears.

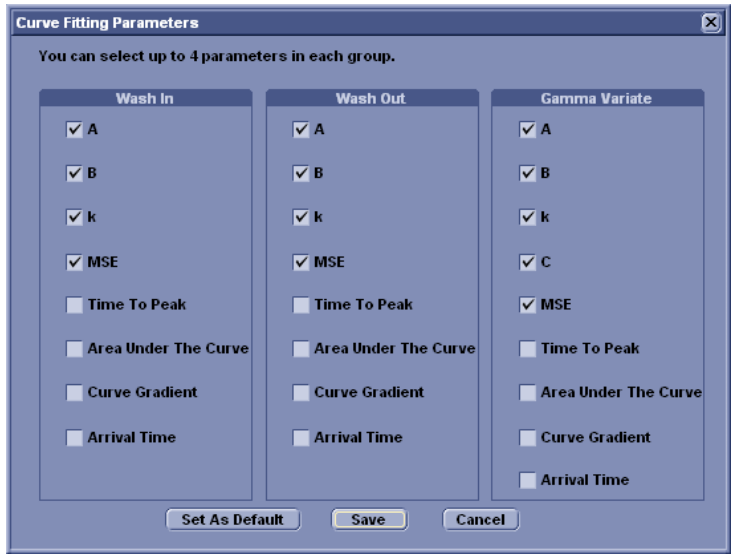



Figure 5-40. Curve Fitting Parameters Dialog

2. Select a maximum of 4 parameters to display for each curve fitting.
   - Save as default: saves as a system preset.
   - Save: saves as temporary.
   - Cancel

*NOTE: If you select more than 4 parameters and select "Save" or "Save as default," you will be prompted to select only 4 parameters.*

**Display/Hide Calculation Values (continued)**

3. The selected parameter displays below the image with the curve fitting active. Press the display button to display all parameters; or press the hide button to hide all parameters.

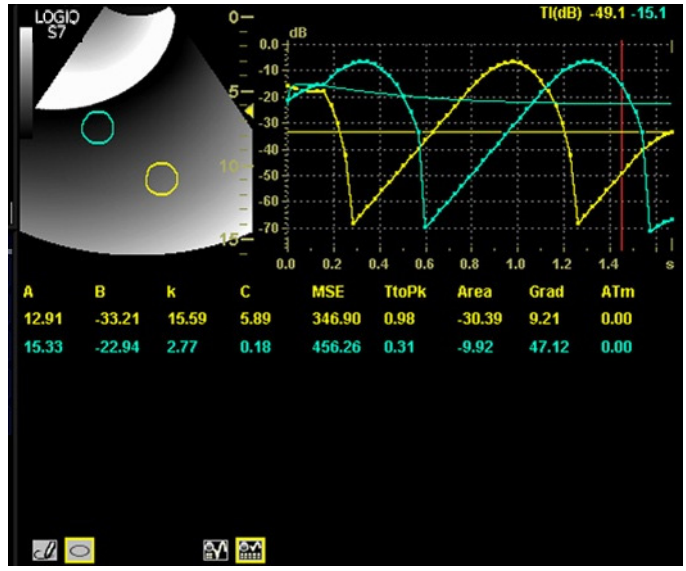



Figure 5-41. TIC image with all parameters

### Exporting Traces (Saving the Trace Data)

You can save the trace data to an external file.

1. Select ***Export Traces*** to save the trace data.

   OR

   Position the cursor to the Analysis window and press the left **Set** key. The system menu displays. Select ***Export traces***.

2. The following window displays.

Figure 5-42. Export Trace Window

   - Location: Select Location which to save.
   - Filename: Enter the filename. (Only Text)

3. Select ***OK*** to save the data and return to the TIC Analysis screen.

   - All displayed ROI traces are saved in the exported file.
   - The fit parameters are included in the trace file if the user has done a curve fit.

**Exporting Traces (Saving the Trace Data) (continued)**

All plot data (intensity, gradient and gradient derivative) are exported to a text file by “Export Trace”.

Table 5-8: Example of exported file

| Time(s): | Trace 1: | Trace 1 dGrad.: | Trace 1 dGrad. |
|---|---|---|---|
| 0.00000 | -3.97995e+000 | -2.15924e+001 | 8.05159e+001 |
| 0.03121 | -5.14631e+000 | -1.64719e+001 | 1.74256e+001 |
| 0.06242 | -5.75798e+000 | -1.27675e+001 | -7.78004e+001 |
| 0.09362 | -6.02222e+000 | -1.27675e+001 | -1.93426e+002 |
| 0.12483 | -6.11224e+000 | -1.44515e+001 | -4.17252e+002 |

*NOTE: The Smoothed trace is the one saved if the user has applied a smoothing filter.*

*NOTE: Only data from the user selected image range is included in the exported trace file.*

*NOTE: Data for disabled frames are not be included in the exported trace file.*

*NOTE: No trace results are saved in the standard image database.*

*NOTE: Trace results are not shown on the Worksheet.*

**Annotating the TIC Data**

The user can annotate both the reference image and the trace plot displays. Use **Comment** key to type the annotation. See Chapter 6 for reference.

**Printing TIC Data**

Press the appropriate print key in the TIC mode.

The system capture a single still frame which consists of the plot, the reference image and user annotation.

# Elastography

## Description

Elastography shows the spatial distribution of tissue elasticity properties in a region of interest by estimating the strain before and after tissue distortion caused by external or internal forces. The strain estimation is filtered and scaled to provide a smooth presentation when displayed.

Below is an example of Elastography. The Elastography color map/bar appears, this image appears in dual image mode, and Elastography imaging parameters appear on the right-side of the display below E.

You activate Elastography via the **Elasto** hard key on the Control Panel.

Elasto is available on ML6-15, C1-5-D and 9L-D probes.

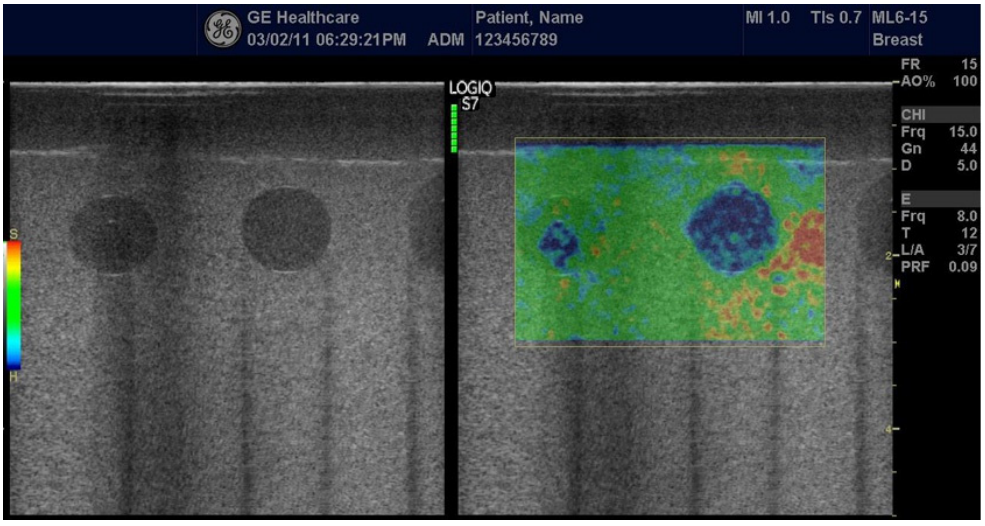



Figure 5-43. Elastography Example

## Activating Elastography

Figure 5-44. Elastography touch panel 1

Table 5-9: Elastography touch panel Description

| Parameter | Description |
|---|---|
| Axial Smoothing | Controls the smoothness of the elastography image in the axial direction. A higher value means a smoother image. |
| Lateral Smoothing | Controls the smoothness of the elastography image in the lateral direction. A higher value means a smoother image. |
| Window | Controls the RF data segment size for the motion tracking. A higher Window value gives a better signal to noise ratio (SNR) at the cost of axial resolution. |
| Map | Controls the elastography maps. Six different maps are available with various contrast and color schemes, including a grayscale map. |
| Frame Average | Controls the persistence of the elastography images. |
| Frequency | Controls the transmit frequency. |
| Soft Compress | Individually controls the image enhancement for the softer than average tissues. |
| Hard Compress | Individually controls the image enhancement for the harder than average tissues. |
| Scale | Controls the time interval between consecutive firings. A lower value dictates a higher sensitivity to weak manual motion. |

Table 5-9: Elastography touch panel Description (Continued)

| Parameter | Description |
|---|---|
| Transparency | High values bring out the tissue behind the elastography data. You adjust via the Color Gain control; this imaging parameter appears as a “T” on the right-hand portion of the display. |

## Activating Elastography (continued)

Figure 5-45. Elastography touch panel 2

Table 5-10: Elastography touch panel Description

| Parameter | Description |
|---|---|
| Biopsy Kit | Biopsy Kit. |
| Sample Vol | Controls the transmit pulse length. A higher value means longer transmit pulse which gives better SNR but reduces axial resolution. |
| Frame Reject | Controls how many frames get rejected due to low quality vertical motion. A higher value means more frames get rejected. A rejected frame has a completely transparent ROI with the B-Mode background showing through. |
| Noise Reject | Controls how many frames get rejected due to lateral and elevational motion. A higher value means more frames get rejected. A rejected frame has a completely transparent ROI with the B-Mode background showing through. |
| Line Density | Optimizes B-Mode frame rate or spatial resolution for the best possible image. |

### How to Use

The Elastography image is achieved by pulsating the probe while you are scanning the anatomy of interest. Here are some criteria to use:

Handheld elasticity imaging can be very dynamic as the size of distortion depends on the movement of the hand-held probe. To maintain stable and consistent displayed strains, pay attention to the Quality graph. Two forms of feedback are provided. In either form, an ideal manual compression is indicated by a high value feedback. In addition, apply the following post-processing controls: Smoothing, Window, Scaling, and Frame Averaging.

Elastography displays firmer tissue in blue and softer tissue in red. To enhance Blue, increase Hard Compress; to enhance Red, increase Soft Compress on the touch panel. To enhance elastography contrast, reselect the Color Map.

If you need more resolution, increase Smoothing, increase Frequency, reduce Sample Volume, or reduce Window.

If you need a smoother image, increase Window, Smoothing, and Sample Volume.

If the images seem too flashy, decrease Frame Reject to 1.0 and Noise Reject to have consistent imaging throughout.

*NOTE:* *Please see ‘Elasto Quantification’ on page 5-166 for instructions on how to use Elastography Quantification.*

## Additional Notes for Elastography

**Definition**. Elasticity index (E) is defined as the value from 0.0 to 6.0. This index shows the color distribution within the measured circle (ROI) relative to the whole ROI box. A higher value means “higher stiffness” and “blue color is dominant”.

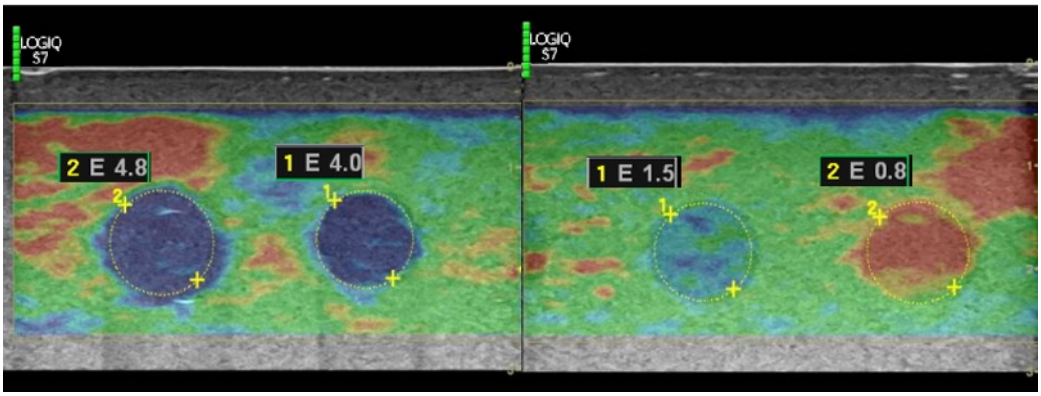



Figure 5-46. Elastography Quantification Definitions

Elasto Raw Data has two data sets of index and color for each pixel. Therefore, this index is not affected by the color appearance change (color map and hard/soft compression). Index detects smaller strain difference of hard region by a assigning wider dynamic range for a smaller strain.

## Additional Notes for Elastography (continued)

**2D Measurement**. Measures the elasticity index of a single ROI and calculates the ratio between two ROIs. You can label two different regions. You can also set the ROI on a reference screen (B mode) with dual screen.

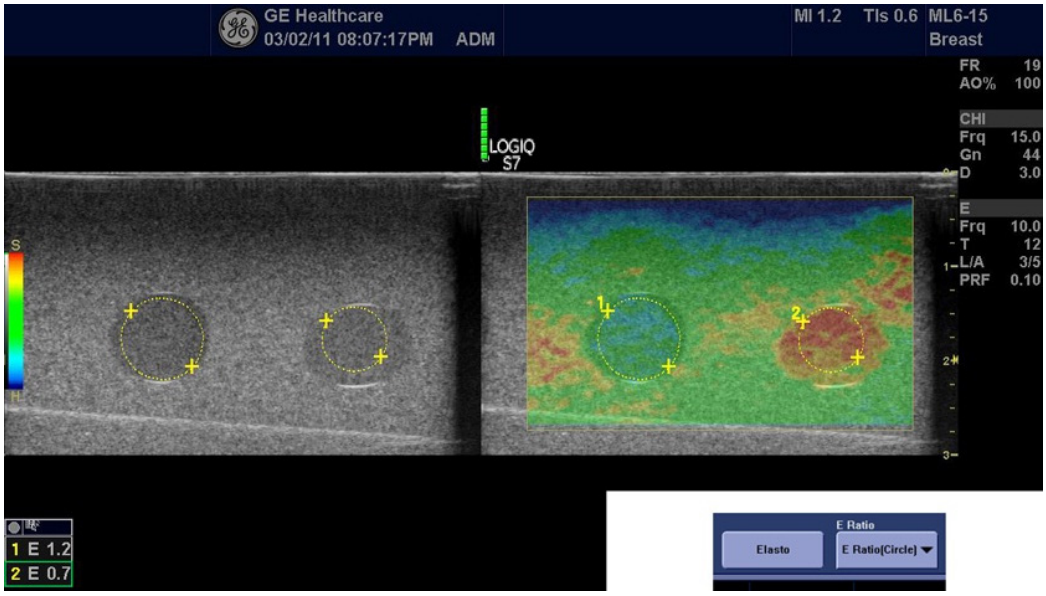



Figure 5-47. 2D Measurements

On the Measure tab, the Elasto touch panel key sets single ROI and calculates E. The E Ratio touch panel key sets two ROIs and calculates the Ratio.

## Additional Notes for Elastography (continued)

HINTS

Limitations:

- This is a relative quantification tool based on freehand manual palpation technology. It cannot show the stiffness by the kPa (kilopascal).
- There is no compatibility among manufacturers regarding the value. It depends on their strain imaging technology and definition of the value.
- Colors indicate degree of stiffness and do not directly correlate to a specific tissue type. Interpretation of what the tissues are and how to apply these ratios clinically is at the discretion of the user.
- Elastography physics dictates that cystic structures will be displayed with a three-layer pattern. This three-layer pattern will start with blue on the LOGIQ S7 Expert/Pro factory default map (which corresponds to hard), then progresses to green and then to red (which corresponds to soft). The posterior displacement of elastography patterns also may cause the B-Mode cyst to consist primarily of blue with the green to red being posterior to the B-Mode cyst. You need to be aware of the three-layer pattern of a cyst in elastography. Utilizing elastography quantification and setting the ROI in the blue portion of the three-layer pattern on the cyst and then setting the ROI in the “normal” tissue may cause you to misinterpret the elastography quantification ratio as the cyst to be hard as compared to the “normal” tissue.

## Elasto Quantification

Quantification plots each elasticity index and their ratio on the timeline axis.

1. When the desired elastography image has been visualized, press **Freeze**.
2. Select a range of CINE loops for analysis.
3. The ***Qanalysis*** button appears on the CINE touch panel. Press ***Qanalysis*** to enter analysis mode.
4. Set the ROI on the image. For ratio calculation, set the first ROI and then set the second and more ROI.

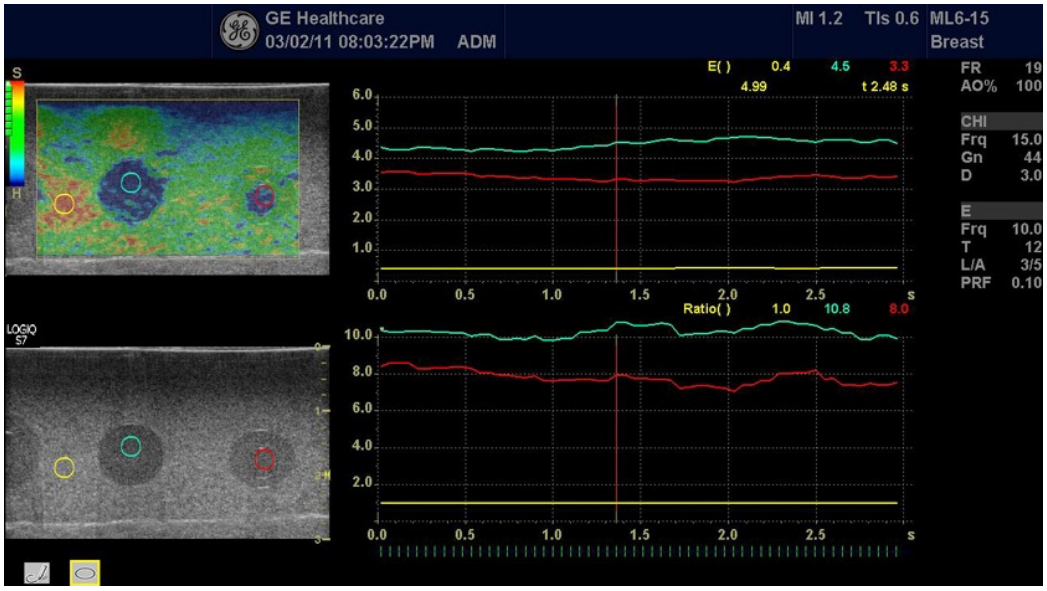



Figure 5-48. Elastography Quantification Analysis Example

### Display the System Menu

Place the cursor to the desired position and press the left ***Set*** key. The system menu displays at the cursor position.

The system menu is dependent on the area which you place the cursor.

### Selecting QAnalysis Image Range

A range of frames is selected for the Qanalysis in Cine mode (before accessing QAnalysis). Only the frames in this range are used for the QAnalysis.

If a range is not selected prior to accessing the QAnalysis, the system uses the default Cine start and end frames as the default start and stop frames.

1. The first frame in the analysis series is selected by adjusting the ***Start Frame*** control to the desired frame

   OR

   using the **Trackball** or the ***Frame by Frame*** control to select the desired first frame and then selecting the ***Start Frame*** control.
2. The last frame in the analysis series is selected by adjusting the CINE ***Last Frame*** control to the desired frame

   OR

   using the **Trackball** or the ***Frame by Frame*** control to select the desired last frame and then selecting the ***Last Frame*** control.

## Generating a Trace

### Trace from a pre-defined sample area

1. If the trackball assignment is not on QA, press the top **Trackball** key until QA highlights.
2. If necessary, select the sample area Ellipse ROI button (shape icon on the monitor display).
3. Move the cursor to one of the Cineloop windows using the **Trackball**.
4. Press **Set** to anchor the sample area.

### Trace from freehand sample area

1. Select the Freehand ROI button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
4. Press **Set** to anchor the sample area.

   The sample area is automatically closed and the trace is updated accordingly in the Analysis window.

**Manual tracking of the sample area (dynamic anchored sample area)**

1. Place a sample area over a region of interest. Note the anatomical location of the sample area.
2. Scroll to a new frame using the **Trackball**.
3. Press the top **Trackball** key until the QA trackball assignment is selected.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to the corresponding anatomical location in the new frame.

   When the sample area is anchored in more than one frame, linear interpolation is performed so that the sample area is smoothly moved between the anchored positions in the selected frames when running the cineloop.
7. Press the top **Trackball** key until the scroll trackball assignment is selected.
8. Using the **Trackball**, scroll through the cineloop and control that the sample area follows the moving anatomical structure.
9. Add anchored sample areas in several frames to obtain a more accurate displacement of the sample area.

**Moving a dynamic anchored sample area**

1. Press the top **Trackball** key until the scroll trackball assignment is selected.
2. Using the **Trackball**, browse thought the cineloop to display one of the frames where the sample area was anchored.

*NOTE: In these frames, the sample area is marked with an anchor.*

3. Press the top **Trackball** key until the QA trackball assignment is selected.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to a new location.
7. Press **Set** to anchor the sample area to the new location.

If you want to move the sample area to the same depth, select ***Move (same depth)*** from the System Menu.

### Delete a trace

The user can delete all traces at once or one at a time.

1. If necessary, press the top Trackball key until the QA trackball assignment is selected.
2. Move the cursor over one of the sample area. Confirm that cursor is changed to hand icon.
3. Press the ***Delete Sample Area*** on the touch panel.
4. Select ***Current Sample*** or ***Delete all*** as necessary.

### Zooming in the Analysis window

To zoom:

1. In the Analysis window, press and hold down the **Set** key while dragging the cursor to define the zooming area.
2. Release the **Set** key.

To unzoom:

1. Press the left **Set** key in the Analysis window. The system menu displays.
2. Select ***Unzoom***.

## Manipulating the Sample Area

Up to eight ROIs can be saved on the reference image, with the corresponding eight traces plotted simultaneously on the graph. Each ROI display has a different color, and its corresponding trace data is plotted using that same color.

Once eight ROIs have been saved, the system does not automatically generate an active ROI when the cursor is positioned over the displayed reference image.

The saved ROIs can be a mixture of elliptical and freehand ROIs.

When the user repositions an ROI, the old trace data is erased from the plot and the trace data for the new position replotted.

If the ROI position on the last frame of the selected image range is moved, the corresponding ROIs on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate ROI positions on different frames of the contrast images, and the system shall linearly interpolate the ROI positions for the frames in between the selected frames.

### Setting the default sample area shape

1. Select ***Set sample area shape***. The Information Box displays.

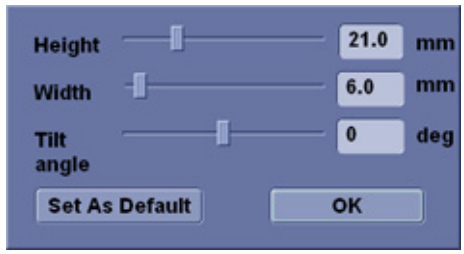



Figure 5-49. Sample Area Information Box

2. Select Height, Width and Tilt angle.
3. Select ***Set as default***. The current ROI size is set as the default for subsequent Ellipse ROIs.

### Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the ROI to reshape and press the left **Set** key.
2. The ROI system menu displays. Select ***Set sample area shape***.
3. Adjust Height, Width and Tilt angle.
4. Press ***OK***. The selected ROI size changes.

### Labeling a Sample Area

The sample area label is used to identify data associated with the sample area when exporting.

1. Position the cursor on the ROI to label and press the left **Set** key.
2. The ROI system menu displays. Select ***Label sample area***. The Label Dialog box displays.
3. Enter a name for the sample area.
4. Select ***OK***.

## Manipulating the Sample Area (continued)

### Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

**Ellipse ROI**

1. Select the ellipse icon (shape icon on the monitor display).
2. When the trackball positions the image display cursor over the reference image(s), an elliptical ROI is automatically generated and displays on the reference image(s).
3. The average velocity value inside the ellipse is calculated for every image in the image analysis range and plotted in the image display area.
4. The last generated or selected ellipse is considered the active ROI, and its trace plot automatically updates as the user repositions it on the reference image. Old traces are erased.
5. When scanning with an elliptical ROI, press **Set** to fix the ROI position and freeze its corresponding trace on the plot. A new active ROI is generated whose position is manipulated by the trackball and whose velocity curve traces will be plotted as before, while the previous ROI and trace remain fixed at the points they were saved at.

*NOTE: Elliptical ROIs can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the ROI is outside the image boundary, only data from within the image boundary is used for calculating the mean velocity value.*

*NOTE: You can change the size of the Ellipse ROI by adjusting the Ellipse control.*

**Sample Area Shapes (continued)**

**Freehand ROI**

1. Select Freehand icon (pencil icon on the monitor display).

   Use the **Trackball** to position the caliper on the reference image at the start point. Press **Set** to fix the start point.
2. While holding down the **Set** key, trace the outline of the desired ROI by moving the caliper with the **Trackball**.
3. LS7

   Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
4. When a suitable ROI has been drawn, release the **Set** key.

   The caliper is then free for repositioning for another freehand ROI.

*NOTE: You cannot go outside the image boundary when drawing a freehand ROI.*

## Manipulating the Sample Area (continued)

### Copy, move, and paste a Sample Area

To copy and paste the ROI,

1. Move the cursor over the ROI and press the left Set key. The system menu displays.
2. Select ***Copy sample area***.
3. Move the cursor to the desired location for the copied ROI and press the left Set Key. The system menu displays.
4. Select ***Paste sample area***.

To copy and move the ROI,

1. Move the cursor over the ROI and press the left Set key. The system menu displays.
2. Select ***Copy & move***. Or if you want to move to the same depth as the original ROI, select ***Copy & move (same depth)***.
3. Move the copied ROI using the **Trackball**. Press **Set** to fix the position.

### Deleting a Sample Area

Sample ROIs and their corresponding traces can be deleted using ***Delete Sample Area***.

1. Select ***Delete Sample Area***; a pull-down menu displays.
2. Select ***Current sample*** to delete the currently active ROI.

   Select ***Delete all*** to delete all currently set ROIs and all of their traces.

*NOTE: The corresponding traces for the deleted ROIs are erased from the plot.*

*NOTE: Deleting an ROI causes the ROIs to be deleted from all frames in the analysis loop.*

## Plot Control

The following controls are user configurable presets. When using the pull-down menu:

1. Place the cursor over the analysis window and press the left ***Set*** key. The system menu displays at the cursor position.

Figure 5-50. System menu - Example

2. Select the appropriate parameter.

### Vertical auto-scaling

The system can be configured to display the full unit range or a range according to the maximum and minimum values of the displayed trace(s) (auto-scaling function). In addition, the auto-scaling function can be set to be live update (updates while the sample area is moved) or delayed (updated when the sample area is anchored).

- ***Delayed***—The system automatically rescale the vertical axis of the trace graph only when a new ROI is saved, to account for changing input dynamic range.
- ***On***—The system automatically rescale the vertical axis of the trace graph every time the currently selected (active) ROI is moved.
- ***Off***—Disable any automatic scaling of the vertical axis. There is user-defined system defaults on the system preset page for the fixed vertical scale to be used for the plot.

## Plot Control (continued)

### Horizontal Scale

Set the horizontal unit as time scaling (s) or time interval (dt) between frames.

### Line Style

- ***Solid***—Setting the results in a plotted trace that does not display small boxes at the data points
- ***Squares***—Setting the results in a plot where small squares are displayed at each data point, and the squares are linked together by lines.

### Horizontal Sweep

Horizontal Sweep allows you to increase or decrease the time interval over which to plot the analysis curve.

The Horizontal Sweep control can range from TBD on the short side to the time interval between the user selected first and last frame. The default is the user selected image range. If the user has not yet selected a first and last frame, the first and last default frames from the displayed CINE loop are used.

## Plot Control (continued)

**Ratio**

Select ***Ratio*** allows the user to toggle between Elastography data and Ratio plot display.

The LOGIQ S7 Expert/Pro plots the ratio of the original ROI and the first ROI (ROI 1). The two plots are displayed together one on top of the other in the plot area.

Ratio formula: Ratio = ROI 1 / ROI n (n: 2-8)

Ratio for ROI 1 is 1.0 for all frames. When ROI 1 is removed, then Ratio is not calculated for ROI n (n: 2-8).

**Ratio Plot Values**

- Ratio
- Diff: The LOGIQ S7 Expert/Pro displays the second derivative as a function of time below the traditional plot.

  Diff formula: Ratio Diff = ROI 1- ROI n (n: 2-8),
- All: The LOGIQ S7 Expert/Pro plots the three plots in the plot area of the screen.
- Off

## Plot Control (continued)

### Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter available is depending on the analysis signal displayed.

1. Select ***Smoothing***.

   OR

   Position the cursor over the analysis window and press the left ***Set key***. The System menu is displayed at the cursor position. Select ***Smoothing***.

*NOTE: When smoothing is turned on, it applies to all traces in the plot window.*

2. The smoothing filter list displays. Select the appropriate parameter.

### Disabling/Enabling the frame

Frame disabling excludes the actual frame from the cineloop display. Frame disabling is available only with contrast data.

### Disabling the frame from the frame marker

To disable One Frame :

1. Use the **Trackball** to move the cursor to the frame maker to disable.
2. Press **Set** to disable the frame.
3. The frame marker is changed from green to red to indicate the frame has been disabled.

*NOTE: The disabled frame is no longer displayed in the reference window when scrolling through CINE memory.*

### Disabling multi-frames from the frame marker

1. Use the Trackball to move the cursor to the first frame maker to disable.
2. Press and hold down ***Set***
3. Move the cursor with the Trackball to the last frame to be disabled and release Set.

   The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

**Disabling/Enabling the frame (continued)**

**Disabling a frame from the cineloop window**

1. Use the Trackball to move the cursor to the cineloop window.
2. Press the left ***Set*** key. The system menu displays.
3. Select ***Disable frame***.

   The current frame is disabled and the corresponding frame marker displays red.

**To enable the frames**

To re-enable all deleted frames :

1. Position the cursor on the Frame Marker line and press the left ***Set*** key. The system menu is displayed at the cursor position.
2. Select ***Enable all frames***.
3. All disabled frames are re-enabled.

**Disabling Frames - Auto**

When the user enters Elasto Quantification, the useless frames are disabled automatically. The LOGIQ S7 Expert/Pro uses Elastography Index value to find useless frame (low quality frames).

## Exporting Traces (Saving the Trace Data)

You can save the trace data to an external file.

1. Select ***Export Traces*** to save the trace data.
2. The following window displays.

Figure 5-51. Export Trace Window

- Location: Select Location which to save.
- Filename: Enter the filename. (Only Text)

3. Select ***OK*** to save the data and return to the QAnalysis screen.
   - All displayed ROI traces are saved in the exported file.

*NOTE: The Smoothed trace is the one saved if the user has applied a smoothing filter.*

*NOTE: Only data from the user selected image range is included in the exported trace file.*

*NOTE: No trace results are saved in the standard image database.*

*NOTE: Data for disabled frames are not be included in the exported trace file.*

### Annotating the QAnalysis Data

The user can annotate both the reference image and the trace plot displays. Use **Comment** key to type the annotation. See Chapter 6 for reference.

### Printing QAnalysis Data

Press the appropriate print key in the desired analysis mode.

The system captures a single still frame which consists of the plot, the reference image, and user annotation.

### Exiting QAnalysis

There are several methods to exit QAnalysis.

- Toggling ***Exit QAnalysis*** on the QA touch panel.
- Press **Freeze** to unfreeze and resume scanning.
- Press any other button that returns the system to real-time scanning.

# Using 3D

## Overview

DO NOT scan any pacemaker patient using the sensor device. The magnetic fields emitted from the device may interfere with the pacemaker operation.

There are two 3D Packages:

Table 5-11: 3D Package Options

| 3D Type | Description | Sensor/No Sensor | Available Tabs |
|---|---|---|---|
| Easy 3D | Designed for rendering B Mode images, e.g., Baby Face scans. | No sensor | 3D Acquisition, Easy 3D, Movie |
| Advanced 3D | Designed for rendering B Mode and Color Flow Mode images, e.g., vessel trees. | No sensor | 3D Acquisition, Easy 3D, Advanced 3D, Movie |

## 3D Acquisition

### Acquiring a 3D Scan

To acquire a 3D scan,

1. Optimize the B-Mode image. Ensure even gel coverage.
2. Press the 3D control panel key. Two screens appear.

*NOTE: Set appropriate values for Acq Mode and Scan Plane. Also, set the scan distance before scanning.*

3. To start acquiring the image, press ***Start*** (Trackball key).
4. To perform a parallel scan, scan evenly. To perform a sweep (fan) scan, rock the probe once. Note the distance of the scan.
5. The 3D volume of interest (VOI) is dynamically assembled on the right side of the screen.

*NOTE: If the image stops before you're done scanning, start acquiring the 3D volume of interest again.*

6. To complete the 3D scan, press ***End*** (Trackball key).

*NOTE: You can also press Freeze, but then you need to also press the 3D key to obtain the final render.*

### 3D Notes

- Adjust the 3D dataset brightness with B-Mode or Color Flow Mode Gain.
- Use Colorize to change the color of the active dataset.
- Use Zoom to increase the zoom factor of the active dataset.
- Vertical lines may be seen in a resliced image. This usually happens when you scan too fast or if the scan distance is set to a high value.

  Scan more slowly, adjust the frame rate for a faster rate or adjust the scan distance.

## Manipulating the Volume of Interest

Imagine you are able to manipulate the 3D volume of interest (VOI) in your hand. The 3D VOI is a tangible anatomical object that you can see and manipulate easily using the Trackball and Set control panel keys.

Practice positioning the pointer at different places within the 3D VOI. Highlight different colors (white, red, yellow, or green). Press Set to select a VOI for manipulation. Use the hand to manipulate the 3D VOI.

### Rotating the 3D VOI Left/Right or Forward/Backward

You can rotate it left to right or right to left. You can rotate it forward/backward. Press right Set key when the white pointer finger is positioned on the white box. Move the closed white hand to manipulate the 3D VOI.

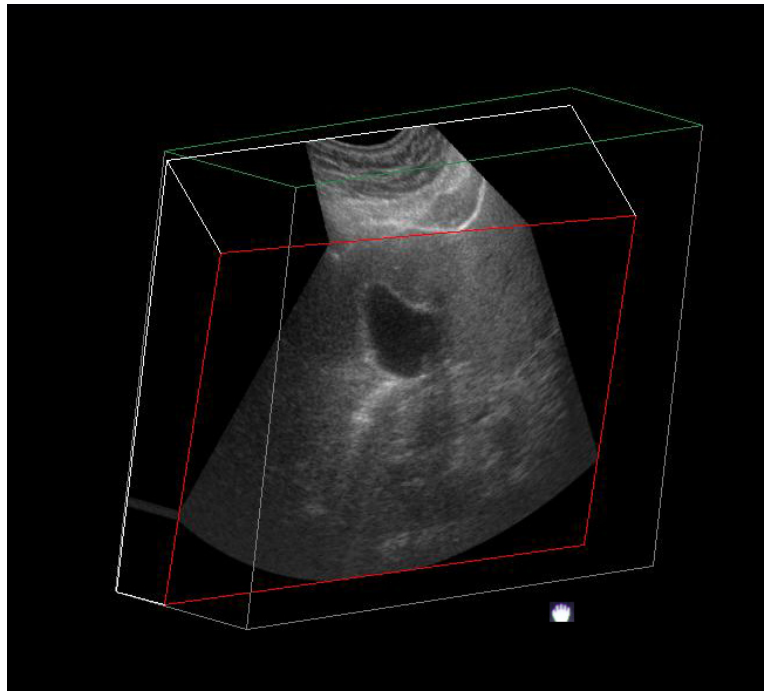


Figure 5-52. Manipulating the 3D Volume of Interest (White Hand)

### Moving Through the 3D VOI

You can move through the 3D VOI using the red hand. Press Set when the red pointer finger is positioned on the red box. Move the closed red hand to move through the 3D VOI.

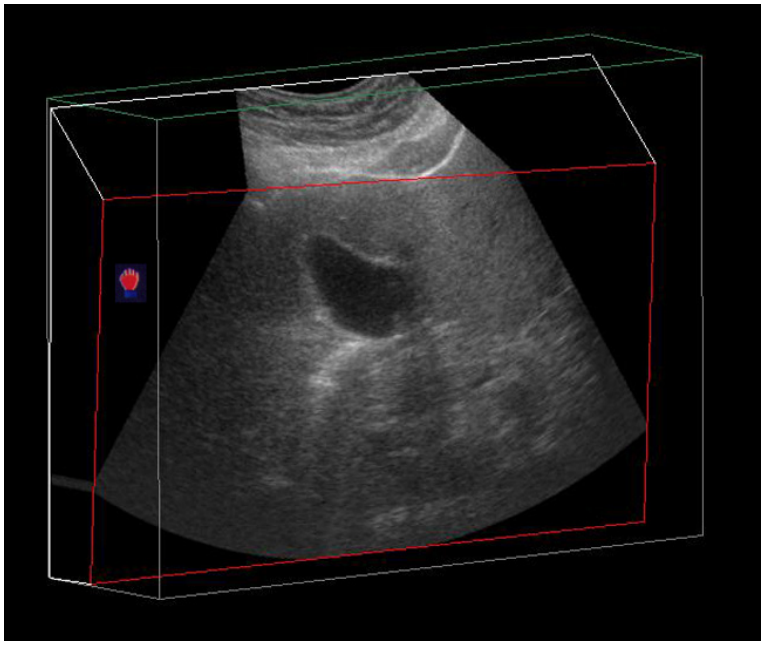


Figure 5-53. Moving through a 3D Volume of Interest (Red Hand)

*NOTE: Any plane in the volume can be made active (highlighted with red box) by clicking on it.*

### Viewing Specific Portions of the Anatomy

You can pull back tissue to view specific portions of anatomy using the yellow hand. Press Set when the yellow pointer finger is positioned on the yellow box. Move the closed yellow hand to manipulate the 3D VOI.

*NOTE: This actually moves an edge. A yellow hand appears only when the pointer is on an edge of the VOI.*

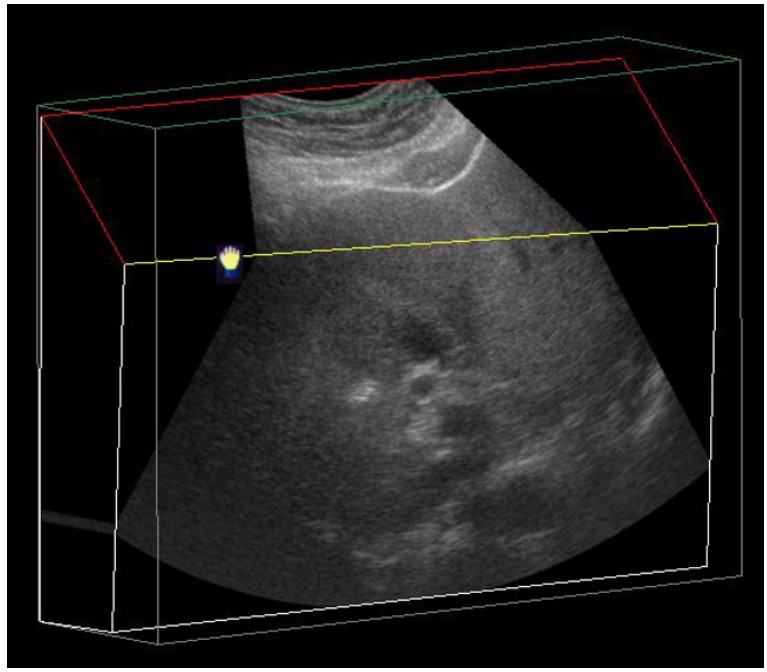


Figure 5-54. Manipulating the Edge of a 3D Volume of Interest (Yellow Hand)

### Pulling Back a Corner of the VOI to View Specific Anatomy

You can pull back a corner to view specific portions of anatomy using the green hand. Press Set when the green pointer finger is positioned on the green box. Move the closed green hand to manipulate the 3D VOI.

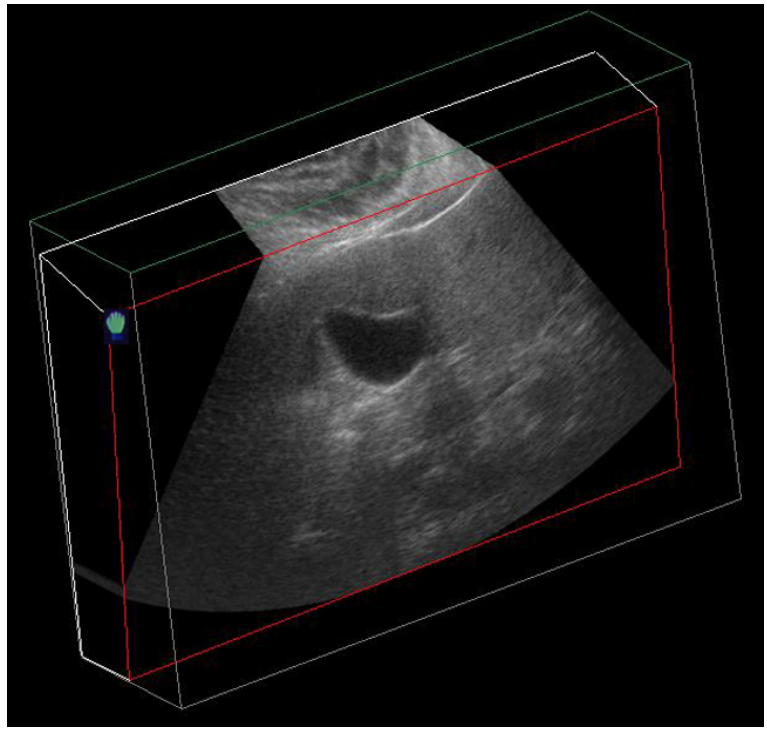


Figure 5-55. Manipulating a Corner of the 3D Volume of Interest (Green Hand)

## 3D Acquisition Parameter Description

Figure 5-56. 3D Acquisition

Table 5-12: 3D Acquisition Description and Instructions for Use

| 3D Parameter | Description |
|---|---|
| Application Presets | Selections: None, OB - Baby Face, Vascular<br><br>**None**. No application preset applied.<br><br>**OB - Baby Face.** After having scanned in this mode, certain rendering parameters are set automatically. The gray surface mode is activated and the texture mode is switched off. The gray surface mode values for opacity and threshold are set automatically according to the datasets histogram.<br><br>**Vascular**. Available only with Advanced 3D or Tru 3D package. After having scanned in this mode, certain rendering parameters are set automatically. The color image is rendered in the texture mode. The values for opacity and threshold of the texture mode are set automatically according to the datasets histogram. The B-Mode image is rendered in the gray surface mode. Opacity and threshold values are defined according to the histogram. |

Table 5-12: 3D Acquisition Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Acquisition Mode | Selections: Sensorless Parallel, Sensorless Sweep<br><br>**Sensorless Parallel**. In this mode the probe must be moved during 3D data acquisition without angling it. You should scan the object you want to render in 2-4 seconds. The speed at which you scan should be constant. No sensor is mounted on the probe.<br><br>• Since the time for post-processing depends on the acquired number of frames, it is recommended that you check the frame rate. Low frame rates result in fewer acquired frames for the 3D dataset which results in intensive post-processing (interpolation). Therefore, low frame rate = long post-processing.<br><br>**Sensorless Sweep**. In this mode the probe must be moved to a position where you can clearly see a middle cut of the object you want to scan and render. Tilt the probe to about 30 degrees until the object you want to scan disappears. Start the acquisition and tilt the probe over a distance of around 60 degrees until the object disappears again. The entire scan time should be around 2-4 seconds. During the sweep, the probe may not be moved parallel, just tilted. No sensor is mounted on the probe.<br><br>Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move. |

Table 5-12: 3D Acquisition Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Acquisition Mode | **With Sensor**. Only available if you are using the Tru 3D package. In this mode the probe can be moved in different ways over the object you want to render. The probe can be moved parallel and angled during the same 3D acquisition. The sensor system registers any movement. It is recommended not to move in one direction and back again during one scan. It is also not recommended to turn the probe around its axis. The scanning speed does not have to be constant, but you should not change the velocity too much. In this mode the sensor has to be mounted on the probe.<br><br>Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move.<br><br>The transmitter has to be placed in such an orientation that the probe with the receiver attached is always in the forward hemisphere of the transmitter during scanning. If the distance between the receiver and the transmitter exceeds 70 cm, a beep tone signals that the data acquisition has been interrupted.<br><br>The patient MAY NOT move during the acquisition.<br><br>The sensor device consists of an electromagnetic field transmitter and a field receiver. The field transmitter generates an alternating spheric electromagnetic field in a strength of up to five times the earth's magnetic field, depending on the distance between the transmitter and the receiver. For 3D data acquisition, the probe with the attached position sensor can be moved freely in an area of 0.7 cm around the transmitter.<br><br>During data acquisition, the electromagnetic sensor device generates with a frequency of about 100 Hz a set of three translation and three angle values. These values describe the position of the ultrasound probe in space. |
| Scan Plane | Selections: Front to Back, Side to Side<br><br>**Front to Back**. After having scanned in this mode, the rendered dataset is shown in a frontal view. For acquiring a fetal face in sagittal cuts, use this mode.<br><br>**Side to Side**. After having scanned in this mode, the rendered dataset is shown from a side view. For acquiring a fetal face in coronal cuts, use this mode. |
| 3D | Starts the rendering process. |

Table 5-12: 3D Acquisition Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Scan Distance | Adjusts the distance covered during the scan. Depending on the real width of a scan acquired during a sensorless 3D acquisition, the volume of interest's width can be enlarged or reduced. You can adapt the form of a fetal face if the baby's head looks oval instead of round. The assumed default width of a parallel scan is 6 cm; of a fan scan 60 degrees. |

*NOTE: The selection of user presets is effective only while 3D mode is active. Exiting 3D mode and activating 3D mode again resets the 3D presets to the default setting, regardless if Patient or application changes.*

*NOTE: Changing the tab between [Easy] and [Adv3D] changes some parameters that are not common between those tabs.*

*NOTE: When a 3D image is recalled, no 3D presets are active and parameters are recalled from the image file.*

*NOTE: Default Scan Distance, Opacity and Threshold may not be consistent and may change per scan. After the User Preset is saved and recalled, Opacity and Threshold are consistent.*

## Easy 3D

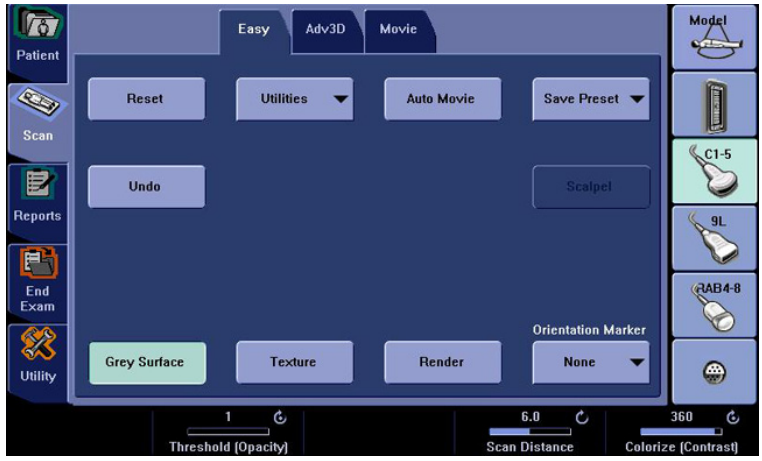



Figure 5-57. Easy 3D

Descriptions and instructions for using Easy 3D follow:

Table 5-13: Easy 3D Description and Instructions for Use

| 3D Parameter | Description |
|---|---|
| Reset | Resets the 3D volume of interest back to its original orientation. |
| Utilities | Select Average Off, Average Light, Average Medium, or Average Strong. |
| Undo | Undoes any manipulation you have done to your 3D dataset. |
| Auto Movie | Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated. |

Table 5-13: Easy 3D Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Scalpel | Structures, for example a part of the placenta hiding the view to a fetal face, can be cut out in a rendered image. All visible structures can be cut out.<br>The option of ‘erase inside’ deletes all structures inside the marked region. The option of ‘erase outside’ deletes all structures outside the marked region.<br>The region in the rendered image is marked with the right Set key. To define the contour of the region, press the right Set key for each vertex. To close the contour, double click the right Set key. As long as a contour is not closed, it can be traced back with the left Set key. The cut out process can be undone by the Undo Last function.<br>As soon as the Apply button is pressed, a new dataset is generated. |
| Gray Surface | Activates the gray surface rendering mode. It leads to a transparent appearance of the object, generated by displaying only a surrounding shell of structures. |
| Texture | Activates the texture or photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object.<br>If both Texture and Gray Surface mode are switched on, the mixture percentage of both modes can be defined. |
| Render | Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above. |
| Threshold/Opacity | Threshold defines which gray values are used for rendering and which are considered noise. Opacity defines how strict Threshold is used for discrimination. A low opacity value creates a firmer appearance of the surface. A high opacity value leads to a transparent appearance of the rendered image. |
| Colorize/Contrast | Colorizes the 3D render or adds contrast to the 3D rendered image. |

Table 5-13: Easy 3D Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Orientation Marker | You can now specify/define, then add the following orientation markers while in 3D via the ***Orientation Marker*** key:<br>• TRV Sup to Inf<br>Ant Scan<br>Prb Rt<br>• TRV Inf to Sup<br>Ant Scan<br>Prb Rt<br>• SAG Lt to Rt<br>Ant Scan<br>Prb Sup<br>• SAG Rt to Lft<br>Ant Scan<br>Prb Sup<br>• Defined<br>• Superior<br>• Inferior<br>• Left<br>• Right<br>• Anterior<br>• Posterior<br>• Cancel<br>• None |

## Movie 3D

Figure 5-58. Movie 3D

Descriptions and instructions for using Movie 3D follow

Table 5-14: Movie 3D Descriptions and Instructions for Use

| 3D Parameter | Description |
|---|---|
| Manual | An animated rotation of the rendered image can be calculated and displayed by this function. Using this function, you first need to define the start and end position of the rotation. To define this, move the VOI to the start position, the press Define Start. Move the VOI to the end position and press Define End. |
| Movie 360 Degrees | The calculation and display of a complete rotation around the axis, defined by the Axis button, starts in steps of 15 degrees. |
| Auto Movie | Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated. |
| Axis | All rotations (Auto Move and Movie 360) are calculated as rotations around the specified axis (X, Y, or Z). |
| Movie Speed | You can adjust the speed of any 3D rotation. |
| Pause | Stops and restarts the rotation. As soon as Pause is pressed, the different rotation steps can be displayed by moving the Trackball. |

## Advanced 3D

Figure 5-59. Advanced 3D

Descriptions and instructions for using Advanced 3D follow:

Table 5-15: Advanced 3D Description and Instructions for Use

| 3D Parameter | Description |
|---|---|
| Tile | The display can be divided into 1, 2, 4, or 6 windows. Switching to a lower number of windows keeps the images from left to right. |
| 3D Landscape | Shows a combination of 2D slices and a 3D rendered image. After a color acquisition you can combine the 2D B-Mode image slices with a 3D rendered color image. This mode allows stepping through the B-Mode images along a vessel structure.<br>The 2D slice can be moved with the right Set key. The Trackball symbol has to be positioned inside the 2D plane. |
| Active Data | Manipulations of rendering parameters only have an effect on the data defined as Active Data. After having selected Active Data, a list of data is displayed, Gray Data or Inversion. Choose the data to be manipulated.<br>Active Data is only available when you select both Inversion and Gray Data in Visible Data.<br>*NOTE: Inversion Mode is only available for Black-and-White mode.* |

Table 5-15: Advanced 3D Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Visible Data | After selecting Visible Data, a list of data is displayed, Gray Data or Inversion. Choose the data you want to display. For example, if only Inversion is chosen, the B-Mode image is switched off in the rendered image and only inversion mode is displayed. |
| Group Plane | Selections: Off, Main, Parallel, Angular<br><br>**Off**. A VOI or a rendered image is displayed. The Render button changes between the rendered image view and the view of the VOI. The VOI shows the acquired Ultrasound images transformed into an isotropic rectangular coordinate system.<br><br>**Main**. Three orthogonal cuts (with colored frames) of the acquired VOI are displayed after pressing Main. The VOI shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system.<br><br>On the left top of the image a complete VOI is displayed. It shows the position of the three orthogonal planes in the VOI. A green point displayed in each plane defines the point of intersection of the three planes. This point can be set to different positions in the planes by double clicking the right Set key. A plane can be moved parallel in the VOI by pressing the right Set key on the position of the green point and moving the Trackball up and down inside the plane.<br><br>**Parallel**. In this mode all displayed VOIs get the orientation of the last modified cube. Normally four VOIs are displayed. It is possible to display six VOIs by increasing the number of displayed cubes in the Tile area. Between the first and the last VOI, the selected planes are parallel and equidistant. A modification on the plane in one VOI results in a parallel modification of the planes in all other VOIs.<br><br>**Angular**. Before starting the Long Axis Rotation Mode, make sure that a long axis has correctly been defined in the VOI (see Define Axis above). The function starts in the long axis display mode. In the upper, left-hand corner a short axis cut is shown which gives an overview of the orientation of the long axis planes.<br><br>To move these planes, press and hold down the right Set key while moving the Trackball. |

Table 5-15: Advanced 3D Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Type 1/2 | Defines the rendering modes. Selections: Gray Surface, Texture, Maximum Intensity, Minimum Intensity, Average Intensity, and None. If both Type 1 and Type 2 rendering modes are switched on, the mixture of both modes can be defined.<br><br>**Gray Surface**. Activates the gray surface rendering mode. It leads to a transparent appearance of the object, generated by displaying only a surrounding shell of anatomical structures. Adjust Threshold and Opacity as well.<br><br>**Texture**. Activates the texture of photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. Adjust Threshold and Opacity as well.<br><br>**Maximum Intensity**. Transparent appearance of the object. Generated by displaying the maximum gray values in the VOI.<br><br>**Minimum Intensity**. The rendered image is generated by displaying the lowest gray values in the VOI that exceed the defined threshold. Dark anatomical structures, like cysts, can be shown in this mode.<br><br>**Average Intensity**. Transparent appearance of the object. Generated by a summation of the gray values.<br><br>**None for Type 2**. No second rendering mode is used in addition to the Type 1 rendering mode. |

## Volume Measurement

The average measurement error for distance measurements is 5% and for volume measurements is 10%.

### Workflow example

*NOTE: If you print out a Volume Measurement image with a B/W printer or store it onto the Clipboard, change the following presets before performing the Volume Measurement. On the Utility -> Connectivity -> Button preset menu in the Physical Print Button section, choose DICOM under Format and Secondary Capture under Image Frame.*

1. Scan in 2D-mode. Acquire and store the image.
2. Recall Image. Activate **3D** and press **R**-key.
3. Select ***Vol. Meas*** Tab. Select ***Angular Method***.

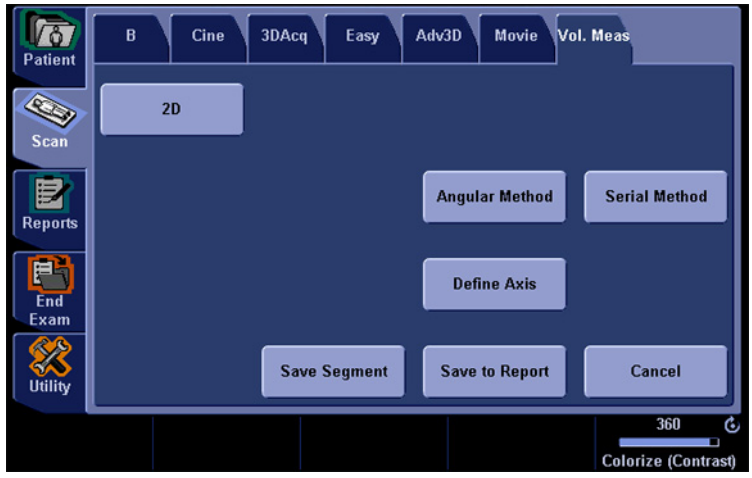



Figure 5-60. 3D Volume Measurement

*NOTE: Angular method is intended for spherical objects. Serial method is intended for rectangular objects.*

4. Define the axis and press **Enter**.
5. Six cut planes are displayed. You measure the volume by marking the contour of the anatomy.
6. When all traces are completed, the system displays the volume in the Results Window.

## Volume Measurement (continued)

Table 5-16: Volume Measurement Descriptions and Instructions for Use

| 3D Parameter | Description |
|---|---|
| 2D | Type of 2D measurement: Distance, Angle, Circumference, Area<br><br>**Distance**. Set the start and end distance using the right Set key.<br><br>**Angle**. An angle is measured by marking two lines. Press the right Set key once marks the beginning of the first line. Press the right Set key again to mark the end of the first line and simultaneously the beginning of the second line (the intersection of two lines). Press the right Set key a third time to close the angle measurement.<br><br>**Circumference**. The circumference of an area is measured by marking the contour of the anatomy by a polygon contour. Each point of the polygon is marked by pressing the right Set key. A double click of the right Set key closes the circumference. As long as the contour is not finished, each point can be deleted by a single press of the left Set key.<br><br>**Area**. An area is measured by marking the contour of the anatomy by a polygon contour. The area of an area is measured by marking the contour of the anatomy by a polygon contour. Each point of the polygon is marked by pressing the right Set key. A freehand contour can be drawn by pressing and holding down the right Set key and moving the Trackball. Double click the right Set key to complete the area. As long as the contour is not finished, each point can be deleted by a single press of the left Set key. |

Table 5-16: Volume Measurement Descriptions and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Angular Method | This function allows you to mark any volume of interest in the dataset to measure its volume or to perform a segmentation of the object.<br><br>The volume of a 3D object is determined by drawing the contour in several planes, which are rotated around an axis defined by the user. The contours are used to calculate the volume of the object.<br><br>To determine the volume of an object based on the multiplanar Simpson rule, you need to define the rotation axis via Define Axis.<br><br>When you press Angular Method, six cut planes are displayed. The Long Axis is marked in blue. You measure the volume by marking the contour of the anatomy. The contour can be marked in different ways: Polygon, Spline, Ellipse, Rectangle, or Rotate.<br><br>**Polygon**. Each point of the polygon is marked with a single press of the right Set key. A freehand contour can be drawn by pressing and holding down the right Set key and moving the Trackball. Double click the right Set key to complete the area. As long as the contour is not finished, each point can be deleted by a single press of the left Set key.<br><br>**Curve**. An area can be marked by single points positioned by pressing the right Set key. A double click on the right Set key closes the spline. The position of the points defining the contour can be changed by clicking on the point and moving it by pressing the right Set key and using the Trackball. As long as the contour is not finished, each point can be deleted by a single press of the left Set key. |

Table 5-16: Volume Measurement Descriptions and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Angular Method | **Ellipse**. When you select this mode, a circle is displayed. You can move the circle by pressing and holding down the right Set key while moving the circle with the Trackball. Press the right Set key to set the chosen position. To manipulate the shape of the circle, move the edges of the circle while pressing the right Set key.<br><br>**Rectangle**. When you select this mode, a rectangle is displayed. You can move the rectangle by pressing and holding down the right Set key while moving the rectangle with the Trackball. Press the right Set key to set the chosen position. To manipulate the shape of the rectangle, move the edges of the circle while pressing the right Set key.<br><br>**Rotate**. Using the rotate function, you can rotate an area around the Z axis. When you select this function, the Trackball symbol changes as soon as it is positioned to an edge of a region. The region can then be rotated by pressing and holding down the right Set key.<br><br>A region can be selected and deleted by pressing the Clear key.<br><br>To save a measurement, press Save Segment, Save to Report, or Cancel. |

Table 5-16: Volume Measurement Descriptions and Instructions for Use (Continued)

| 3D Parameter | Description |
|---|---|
| Serial Method | The Serial Method allows you to mark any volume of interest in the dataset to measure its volume or perform a segmentation of the object.<br><br>A volume definition is done by defining areas at different depths.<br><br>Before starting the volume measurement, you need to select a plan showing a cut in which the object can be clearly defined. When you press Serial Method, the display window shows two different views. The left side displays the active plane as a single plane. The VOI on the right side is displayed in cubic mode.<br><br>In the right VOI select the cut plane position where the measurement process should start. In the left plane, mark the object of interest by designating one of the area definition modes (Curve, Ellipse, Rectangle, Polygon, Rotate).<br><br>After you have completed defining the first area, the depth of the VOI should be changed on the right side. To change the depth, position the Trackball symbol inside the plane to be moved. press and hold down the right Set key while moving the Trackball backwards. By defining the contour of an object at different depths, its volume can be calculated by summing up the defined slices.<br><br>To save a measurement, press Save Segment, Save to Report, or Cancel. |
| Save Segment | After measuring a volume, you can use the defined volume for segmentation by pressing Save Segment. Segmentation means that a new dataset is created with voxel information based on the defined volume. A dataset containing only voxels inside the measured volume is created. The original dataset is saved additionally to the segmented data. The segmented data can be chosen in the Active Data or Visible Data list. |
| Save to Report | After measuring a volume, press Save to Report to register the measurement result in a database that is used for report generation. |

## Volume Measurement (continued)

Measurement examples are shown below:

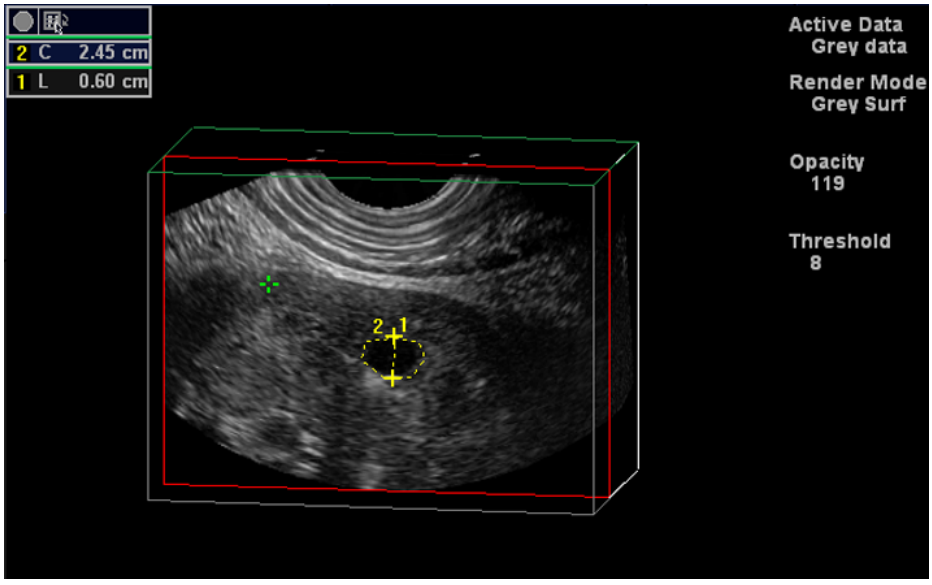



Figure 5-61. 2D Measurement (Example)

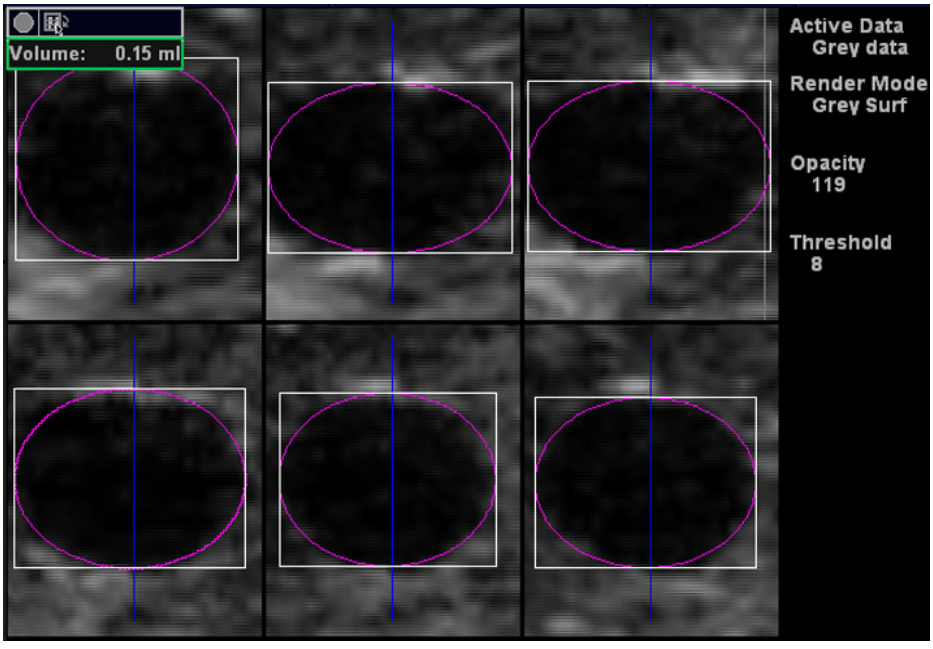



Figure 5-62. Example of Angular Method

**Volume Measurement (continued)**

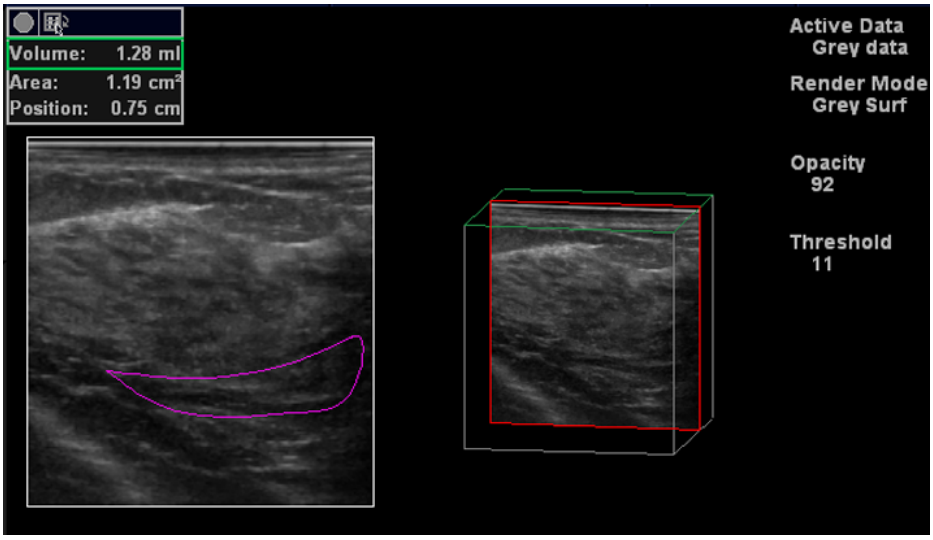



Figure 5-63. Example of Segment Method

# Using 4D

## 4D Introduction

4D provides continuous, high volume acquisition of 3D images. 4D adds the dimension of “movement” to a 3D image by providing continuous, real-time displays. With 4D, you can apply rendering techniques to smooth out the appearance of an anatomical structure, for example, a baby’s spine.

You can perform the following types of volume acquisitions within the 4D feature:

Table 5-17: 4D Package Options

| 4D Type | Description | Acquisition Mode |
|---|---|---|
| 4D | Designed for continuous volume acquisition of a 3D image. | B, 4D |
| Static 3D | Designed for single volume acquisition of a 3D image. | B, 3D |

## Features supported with 4D

The following features are supported with 4D:

- Most B-Mode controls
- Annotations
- Measurements and Calculations

The following post-processing controls are available with 4D:

- CINE
- Zoom

## 4D Principles of Operation

The acquisition of volume starts with a 2D image using special probes designed for performing 3D sweeps and 4D scans. The volume box defines the region of interest to be used for the volume sweep.

Volume sweep refers to the range of the sweep of the 2D image to be transformed into a rendered, 3D or 4D image. Static 3D acquisition involves a single volume sweep. 4D involves multiple, continuous volume sweeps.

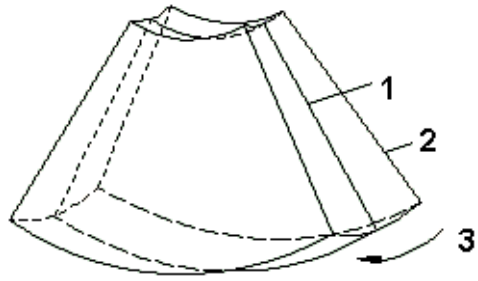



Figure 5-64. Volume Sweep

1. Central 2D scan
2. Start 2D scan
3. Range of VOI sweep

When you initiate a volume sweep, you can adjust the angle of the volume.

### What is Interactive 3D Rendering?

Interactive 3D rendering allows you to visualize certain structures and to view and analyze different sections of the volume.

## Region of Interest (ROI) / Render Box

The Region of Interest (ROI) - also referred to as the Render Box in rendering - contains the section of the volume you want to render. Therefore, objects that are not inside of the box are not included in the render process and are cut out (this is important in surface mode to allow a free line of sight). This may or might not be the entire Volume of Interest (VOI).

You can adjust the view direction of the ROI.

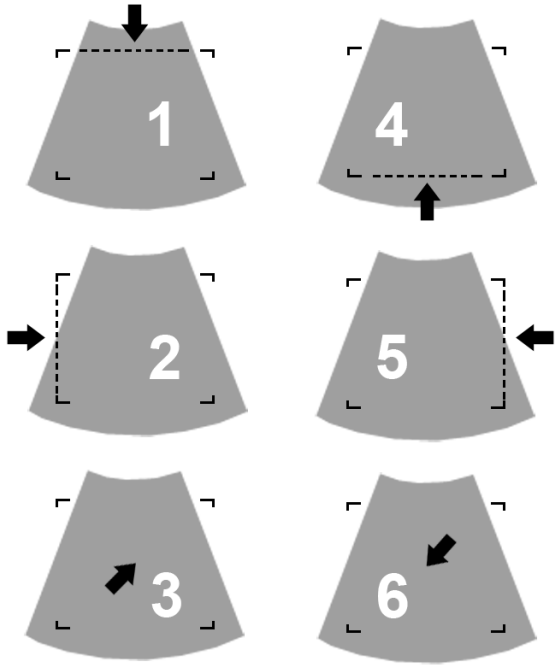



Figure 5-65. Render View Directions

1. Up/Down
2. Left/Right
3. Front/Back
4. Down/Up
5. Right/Left
6. Back/Front

## Region of Interest (ROI) / Render Box (continued)

### Render View

In Render view, only the rendered image displays - no reference images.

## Image Orientation

Orientation of Image in Sectional view

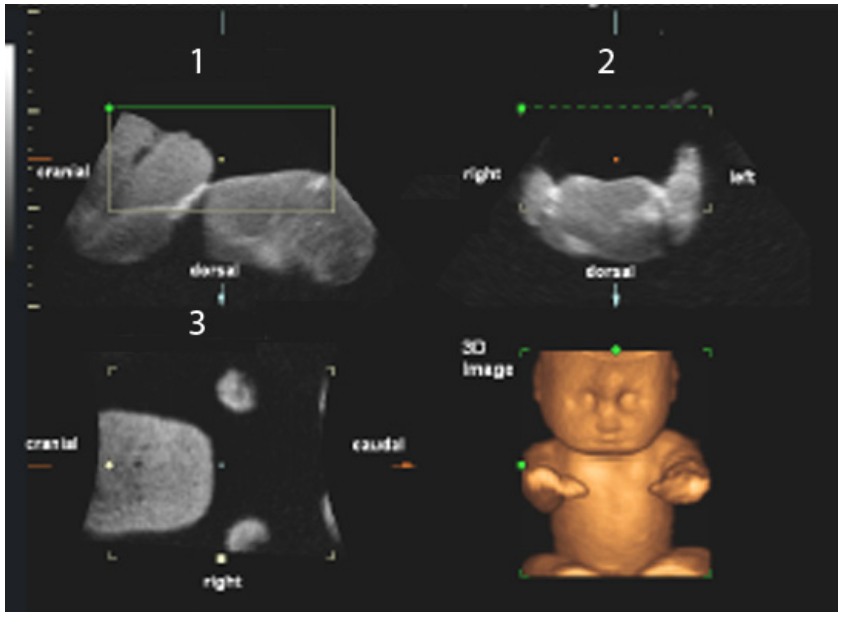



Figure 5-66. Quad Render Visualization Mode

1. Longitudinal
2. Transverse
3. Coronal

## Principle of Sectional Planes

Sectional planes represent three different planes of the same 3D volume. There are three separate planes, A (Longitudinal), B, (Transverse) and C (Coronal).

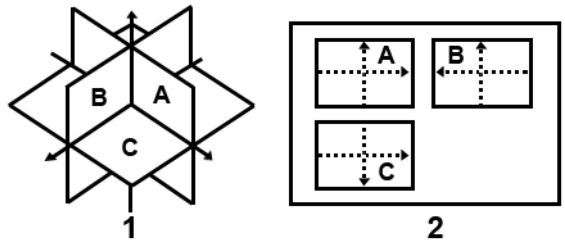



Figure 5-67. Illustration of Sectional Planes

The intersected lines of each plane is color-coded on the display monitor: AB=blue, AC=red, and BC=yellow.

Table 5-18: Orientation of intersected lines

| Section/Field | A | B | C |
|---|---|---|---|
| Intersection of line AB | V | V | H |
| Intersection of line AC | H | N | H |
| Intersection of line BC | N | V | V |
| V=Vertical, H=Horizontal, N=Normal | | | |

The presentation of three orthogonal sectional planes is different from the conventional patient orientation in 2D sonography.

*NOTE: Whenever you select the usual, longitudinal section of the patient to display in field A, the conventional orientation for longitudinal and transverse sections is valid.*

## Reference Images

Reference images are the individual image displays within the corresponding sectional plane. Reference image A represents the longitudinal view; reference image B the transverse view, and reference image C represents the coronal view.

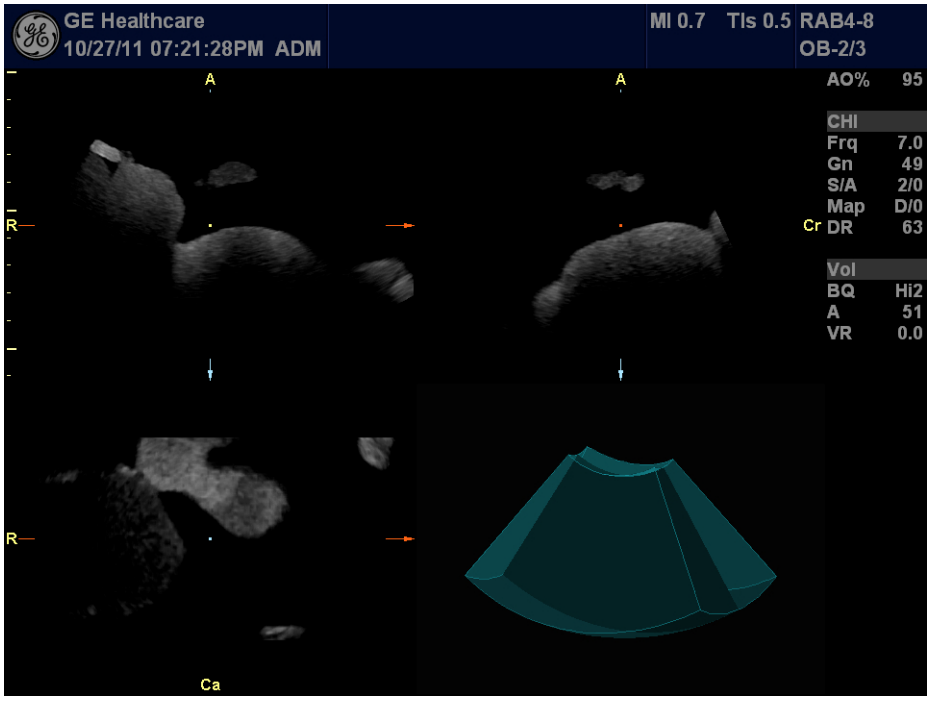



Figure 5-68. Monitor Display of Reference Images in Sectional View

1. Reference Image A (Longitudinal)
2. Reference Image B (Transverse)
3. Reference Image C (Coronal)

**Orientation Help**. When you view a 4D image on the display, it's sometimes difficult to recognize the orientation. To help, the system displays a three-dimensional drawing to illustrate the orientation. This drawing displays ONLY in sectional view.

**Reference Images (continued)**

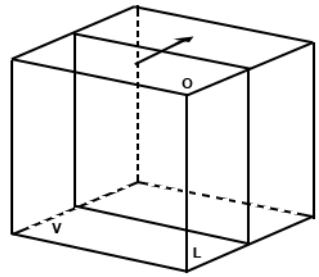



Figure 5-69. Reference Image A

For Reference image A, the transducer beam migrates from the FRONT to the REAR through the volume body.

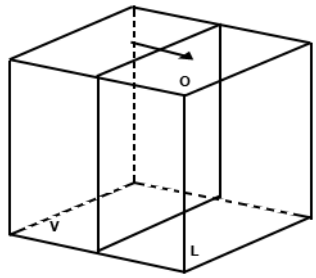



Figure 5-70. Reference Image B

For Reference image B, the transducer beam migrates from the LEFT to the RIGHT through the volume body.

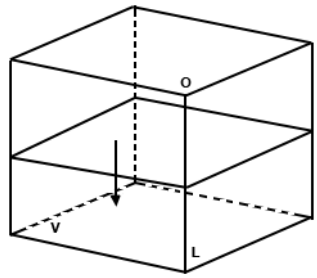



Figure 5-71. Reference Image C

For Reference image C, the transducer beam migrates from the TOP to the BOTTOM through the volume body.

## Reference Images (continued)

### Examples of Probe Orientation with Reference Planes

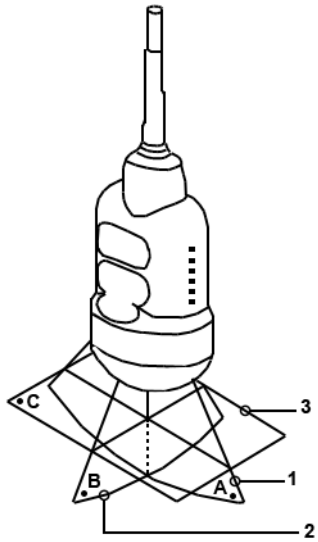



Figure 5-72. Abdominal Probe Orientation

1. Image Plane A
2. image Plane B
3. Image Plane C

## 4D Operational Controls

### Control Panel Overview

When you enter 3D/4D mode, the behavior of some of the Control Panel buttons changes. For example, in 3D/4D mode, you use the PW-Mode, CF-Mode, M-Mode buttons (along with Depth) to manipulate the Volume of Interest (VOI).

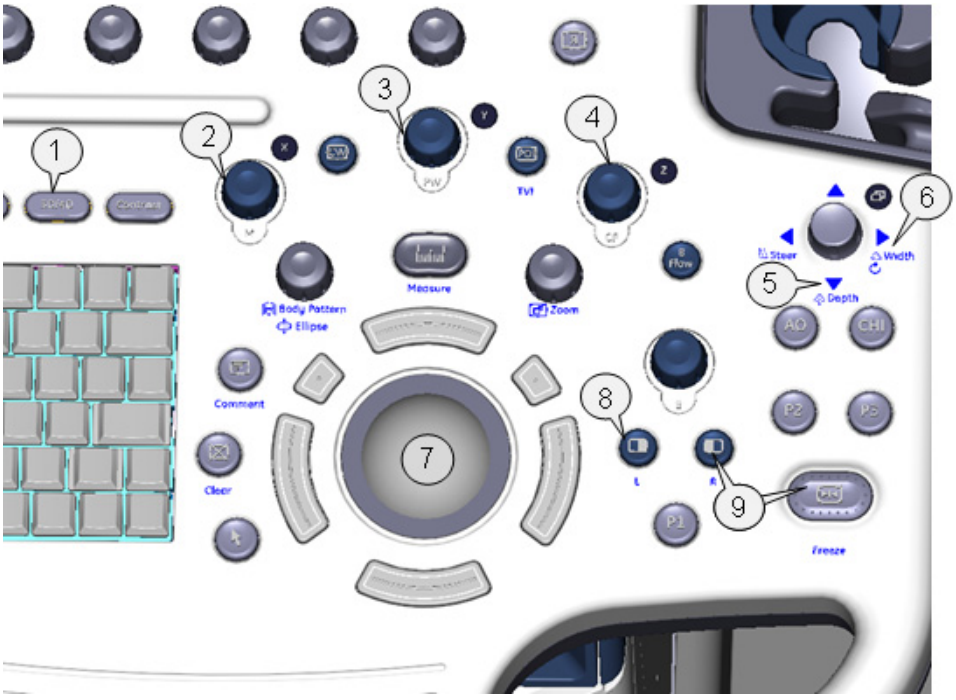



Figure 5-73. Control Panel Buttons

1. 3D/4D key, used to activate/deactivate 3D/4D.
2. M key, M-Mode key used to rotate about the X axis.
3. PW key, PW-Mode key used to rotate about the Y axis.
4. CF Key, CF-Mode key used to rotate about the Z axis.
5. Depth key, used as a transverse translation through the image.
6. Width key, used to adjust the size and position of the VOI.
7. Trackball, used to move the VOI. Also, the 4 keys surrounding the Trackball map to additional functionality, as shown on the monitor display.
8. L (left) key, used to begin a 4D acquisition.
9. Freeze or R (right) key, used to freeze a 4D image.

## 4D Monitor Display

Imaging parameters are displayed in the upper right-hand portion of the display. The 4D specific parameters are Quality (Q), Volume Angle (A) and Volume Rate (VR). The Status Bar contains instructions on the tasks you can perform at each stage of the 4D imaging process. Remember to take a look at the Status Bar as needed.

## 4D touch panel Overview

The following is the first touch panel that appears when you press **3D/4D**.

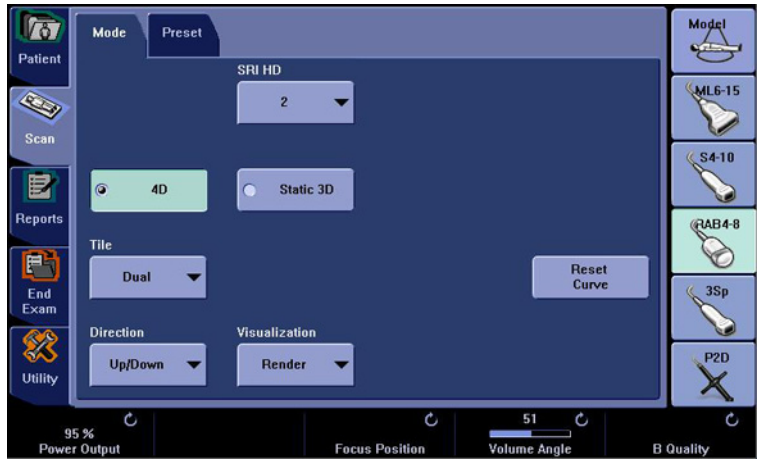



Figure 5-74. First touch panel Displayed When Entering 3D/4D Mode

### Common 4D touch panel Controls

Most 4D touch panel screens contain some similar controls. Refer to the table below for descriptions of these controls. Controls that are unique to or that contain slightly different functionality are described in their respective sections.

Table 5-19: Common 4D touch panel Controls

| Preset Parameter | Description |
|---|---|
| SRI-HD | Allows you to apply SRI-HD (High Detection Speckle Reduction Imaging) to the selected reference image. |
| Tile | You can divide the display into 1, 2, or 4 windows for Render view (Render = On) and 1 or 4 windows for Sectional view (Render = Off). |
| Reset Curve | Resets the three-point curve to a straight line. |
| Direction | Adjusts the view direction of the ROI. |
| Visualization | Sectional, Render, VCI-Static, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image. |
| Focus Position | Adjusts the focal position. |

Table 5-19: Common 4D touch panel Controls (Continued)

| Preset Parameter | Description |
|---|---|
| Volume Angle | Sets the range of the volume sweep. |
| Quality | Balances speed with line density. Max combines the highest density with the slowest speed; Low combines the lowest density with the highest speed. |

## 4D Presets

### Real-Time 4D/Static 3D Presets

1. When you enter 3D/4D mode, press the ***Preset*** tab.

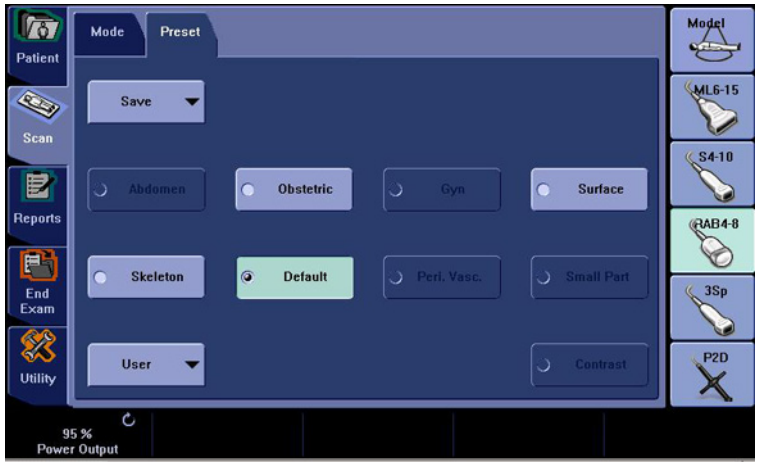



Figure 5-75. 4D Preset

2. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Table 5-20: Common 4D touch panel Controls

| Preset Parameter | Description |
|---|---|
| Save | Selections: Overwrite, Create New, Cancel. **Overwrite**. Overwrite the application preset file with the changes you just made. **Create New**. Create a new user application preset file based upon the current exam category and application. **Cancel**. Cancel without saving preset parameters. |
| Pre-defined Preset | Reloads the presets for the selected application.<br>Abdomen, Obstetric, Gyn, Surface, Skeleton, Default, Peri. Vasc., Small Part, Contrast |
| User1, User2, User3, User4 | Used to define new user presets for a given application. |

### Static 3D Presets

1. When you enter 3D/4D mode, press ***Static 3D***, then the ***Preset*** tab.

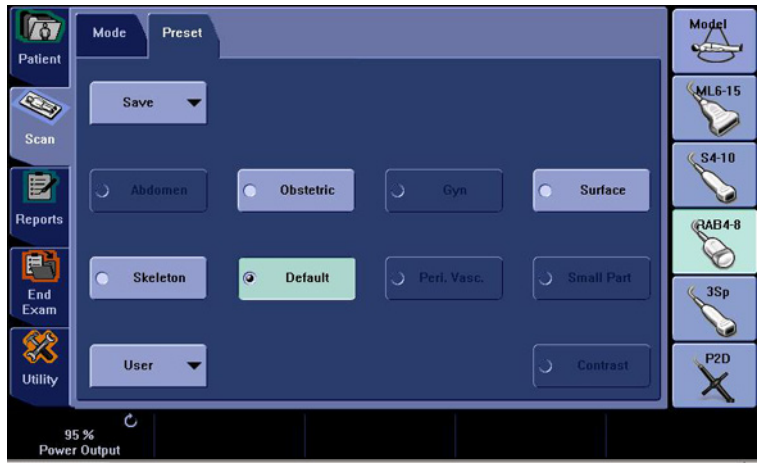



Figure 5-76. Static 3D Presets

2. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

## Performing a 4D Scan

### Visualizations

4D provides two types of views for displaying and working with images: Sectional, Render, and Tomographic Ultrasound Imaging (TUI).

#### Sectional View

Sectional view contains one display for each sectional plane.

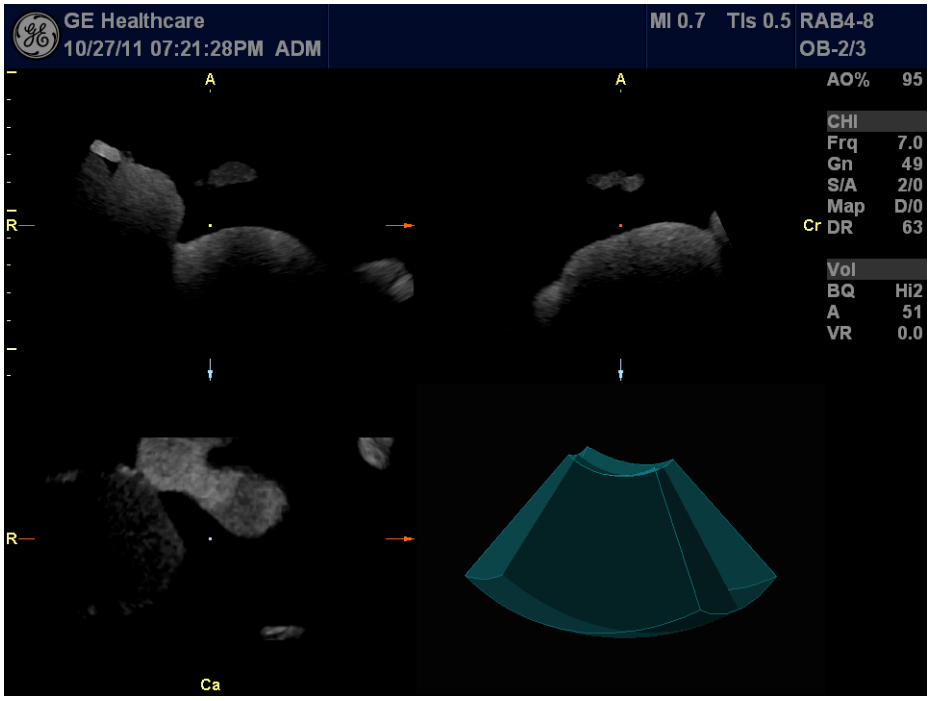



Figure 5-77. Monitor Display in Sectional View

1. Sectional Image A
2. Sectional Image B
3. Sectional Image C

## Visualizations (continued)

### Render View

The LOGIQ S7 Expert/Pro continuously displays the 4D rendered image.

*NOTE: When the tile selection is single, only the rendered 4D image appears. When the tile selection is quad, the sectional images are located in 3 quadrants with the rendered 4D image in the fourth.*

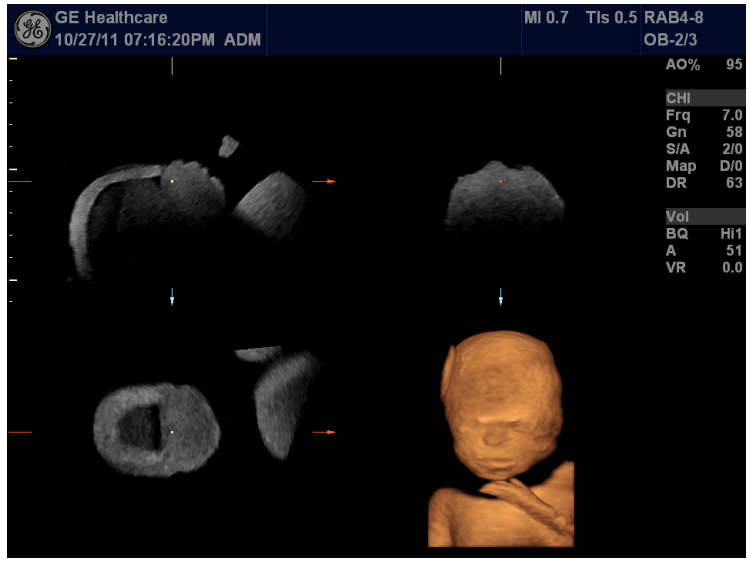



Figure 5-78. Quad Tile Render View

## Orientation Help

When you view a 4D image on the display monitor, it's sometimes difficult to recognize the orientation. To help, the system displays a three-dimensional drawing to illustrate the orientation. This drawing displays ONLY in sectional view.

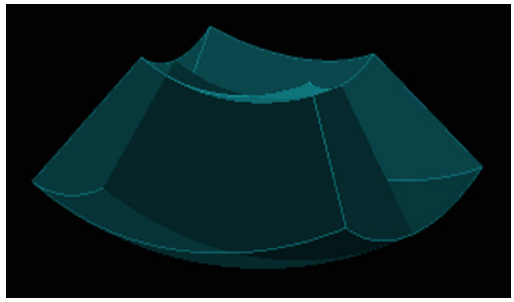


Figure 5-79. Orientation Help Graphic

## Acquiring and Rendering a 4D VOI

### Starting with a 2D Image

To create a 4D image, you start with an optimized 2D image. The 2D image serves as the mid-line for the resulting 4D image.

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.

*NOTE: If the appropriate 4D probe is not connected, the original 3D touch panel appears.*

2. Obtain a 2D image. Optimize the image as usual.

### Entering 3D/4D Mode

In 3D/4D mode, you choose the type of scan you want to perform: 4D or Static 3D.

1. Press **3D/4D** to enter 3D/4D mode. The first time you press 3D/4D, the system is in B Pre mode.

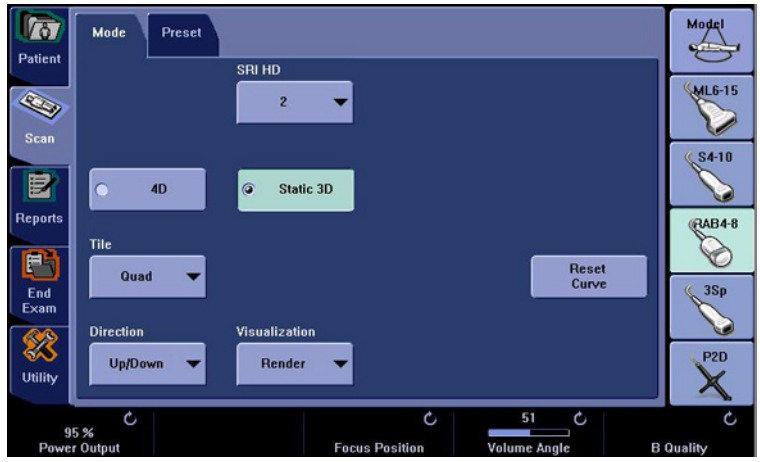



Figure 5-80. First touch panel Displayed When Entering 3D/4D Mode

*NOTE: The location of the number of focal zones might change when you enter 3D/4D mode, since the number of zones is pre-determined by the default ROI.*

**Entering 3D/4D Mode (continued)**

The default acquisition mode varies by application. If you are in OB, the default acquisition mode is Real-Time 4D; for all other applications, Static 3D is the default acquisition mode. When you enter pre-mode, an ROI graphic may appear on the monitor display that defines the initial ROI (Region of Interest) of the volume.

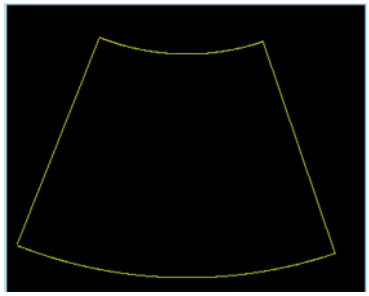


Figure 5-81. ROI Graphic

2. Press the ***Preset*** tab. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

**Quick Acquisition Steps**

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.
2. Select a 4D probe from the probe indicator.
3. Obtain a 2D image. Optimize the image as usual.
4. Press **3D/4D**. An ROI graphic appears. 4D is selected.
5. Define the Volume of Interest (VOI) to be scanned. Use the **Trackball** to move the VOI and the **Width** button to re-size and re-position the VOI. Only the area defined within the VOI is rendered.
6. Adjust the volume angle and quality.This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a high volume rate.
7. To begin 4D acquisition, press the **L** key.

   You DO NOT have to hold the probe steady during data acquisition.

   During data acquisition, you can manipulate the VOI to see different views of the image. To rotate the VOI left or right, use the ***PW*** control. To rotate the VOI forward or backward, use the ***CF*** control. To rotate the VOI in a circular motion, use the ***M*** control.

   To return to 3D/4D pre-mode, press **L**.

*NOTE:* *If the volume size is too large, the message "Volume Size Too Big - Quality Degraded" displays in the status bar. The system changes the quality automatically to below the upper limit and displays the proper Quality value in the information window.*

8. Set Render to On.
9. To complete the acquisition, press **Freeze** or **R**.
10. Store the image.

## 4D

4D provides continuous, high volume acquisition of 3D images. You can apply rendering techniques to smooth out the appearance of an anatomical structure, for example, a baby face.

4D imaging contains two main viewing modes: Sectional, Render, and Tomographic Ultrasound Imaging (TUI). Sectional mode displays three separate representations of the image: Longitudinal (original 2D image), Transverse (elevational), and Coronal (horizontal). Render mode displays one rendered 4D image.

### Acquiring a 4D Volume of Interest (VOI)

Once you have acquired an optimized 2D image, you can perform a 4D scan to acquire the 4D image.

During 4D image acquisition:

- Frame Averaging is disabled.
- You cannot change the transmit frequency.
- To change the position of the focal zone, adjust the depth of the VOI.
- You cannot change the number of focal zones.

**Acquiring a 4D Volume of Interest (VOI) (continued)**

To acquire a 4D VOI:

1. Press ***4D***.
2. Make sure the VOI is defined appropriately. If necessary, adjust the volume angle. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a higher volume rate.

   See Manipulating the Volume of Interest (VOI) for more information.
3. To begin 4D acquisition, press the **L** key. The system will perform continuous sweeps across the VOI. You do not have to hold the probe steady during a 4D scan.

   To return to 4D pre-mode, press **L**.

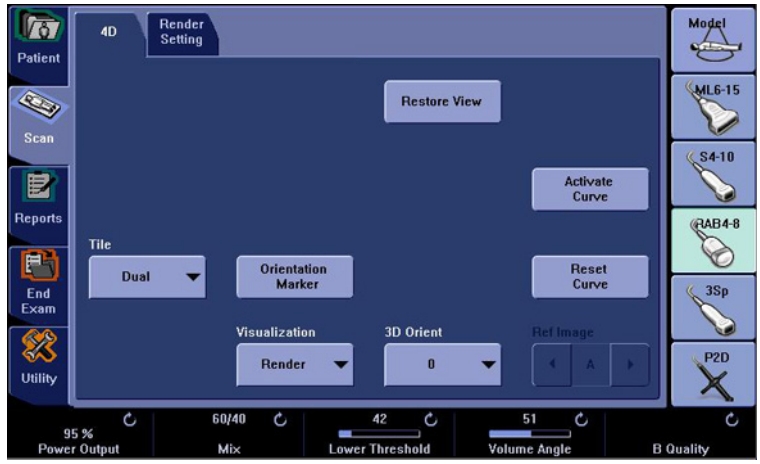



Figure 5-82. 4D Tab - Data Acquisition

4. Set the Render to On.

### Sectional VOI Acquisition

Sectional view provides three separate views of the same image: Longitudinal (original image), Transverse (elevational), and Coronal (horizontal).

1. In the 4D tab, Render defaults to On (Render mode). Change Render to Off for Sectional view.
2. To select a reference image, use the Ref Image control on the touch panel. The reference image selected contains the focus for control panel keys, allowing you to manipulate or optimize that image.

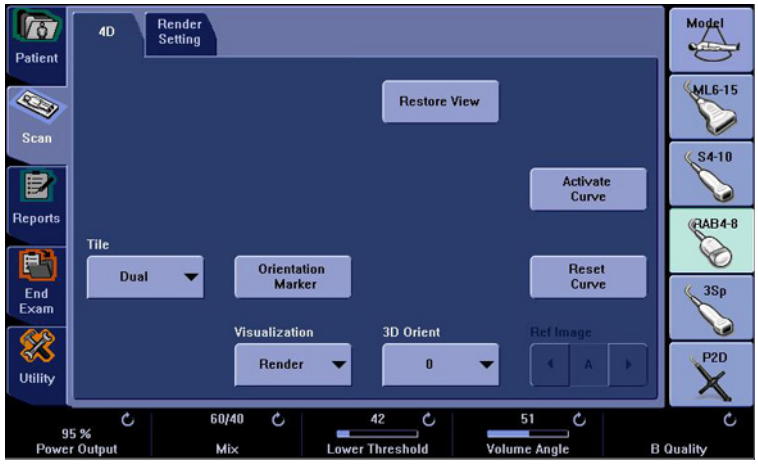



Figure 5-83. 4D Data Acquisition Sectional View

Table 5-21: 4D Data Acquisition Parameters

| 4D Parameter | Description |
|---|---|
| SRI-HD | Allows you to apply SRI-HD (High Detection Speckle Reduction Imaging) to the selected reference image. Values: 0-4 (0=Off). See the SRI-HD (High Detection Speckle Reduction Imaging) section for more information. |
| Restore View | Resets all parameters back to the original values or chosen presets. |
| Tile | Selections: Single, Quad. You can divide the display into 1 or 4 windows. |
| Visualization | Sectional, Render, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image. |

Table 5-21: 4D Data Acquisition Parameters (Continued)

| 4D Parameter | Description |
|---|---|
| Ref Image | Use to select the reference image that has focus for use with the control panel keys and **Trackball**. |
| Orientation Help | Displays a three-dimensional drawing to illustrate the orientation. Only displays in sectional view. |
| Volume Angle | Sets the range of the volume sweep. |
| B Quality | Selections: Max, Hi2, Hi1, Mid2, Mid1, Low. Used to balance speed with line density. Max combines the highest density with the slowest speed. Low combines the lowest density with the highest speed. BQ displays on the LCD display. |

### Render VOI Acquisition

Rendering allows you to distinguish subtle anatomical detail. You can render all areas of an VOI, or just certain regions of the VOI. The region you define for rendering is referred to as the Render Box.

1. Define the area you want to render. For example, if you have an image of an entire fetus, you might only want the fetal face to be rendered. Therefore, you would define the fetal face as the VOI.
2. Set Render to On.

**Render VOI Acquisition (continued)**

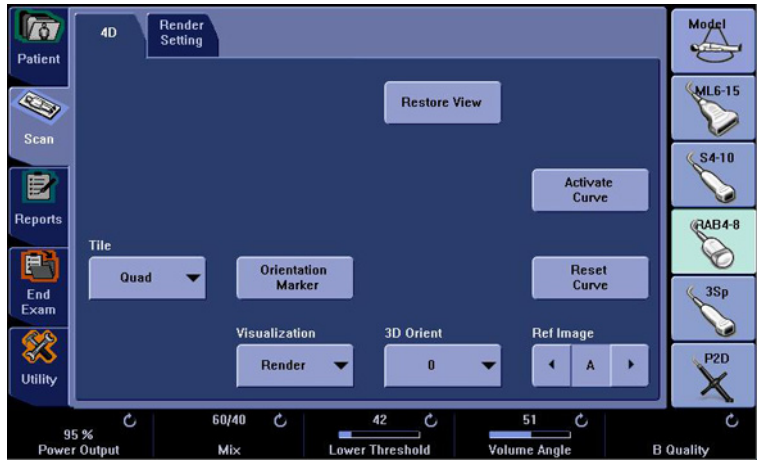



Figure 5-84. 4D Tab (Data Acquisition) Render View

Table 5-22: 4D Data Acquisition Parameters - Render Mode

| 4D Parameter | Description |
|---|---|
| SRI-HD | Allows you to apply SRI-HD (High Detection Speckle Reduction Imaging) to the selected reference image. Values: 0-4 (0=Off). See the SRI-HD (High Detection Speckle Reduction Imaging) section for more information. |
| Restore View | Select to reset all parameters back to the original values or chosen presets. |
| Tile | Selections: Single, Dual, Quad. You can divide the display into 1, 2, or 4 windows. |
| Visualization | Sectional, Render, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image. |
| 3D Orient | When selected, changes the orientation of the image on the monitor display. Selections include: 0 degrees, 90 degrees, 180 degrees, and 270 degrees. |
| Ref Image | Use to select the reference image that has focus for use with the control panel keys and **Trackball**. This control is enabled only if Tile is set to Quad. |
| Volume Angle | Sets the range of the volume sweep. |

Table 5-22: 4D Data Acquisition Parameters - Render Mode (Continued)

| 4D Parameter | Description |
|---|---|
| Quality | Selections: Max, Hi2, Hi1, Mid2, Mid1, Low. Used to balance speed with line density. Max combines the highest density with the slowest speed. Low combines the lowest density with the highest speed. |
| Activate Curve | Define a three-point curved surface for the render window using the Trackball. |
| Reset Curve | Reset the three-point curve to a straight line. |
| Mix | Selections: 0-100% in increments of 2. Allows you to mix a Rend Mode 1 mode with a Rend Mode 2 mode. Always select two modes. |
| Lower Threshold | Selections: 0-255. Sets a lower threshold below which weaker echoes are removed. |

**Render VOI Acquisition (continued)**

1. Select the ***Render Setting*** tab.

   The Render Setting tab allows you select and combine gray-scale and color rendering modes.

HINTS

If you are using Surface modes, we recommend that you adjust the Lower Threshold to recognize border structures more clearly.

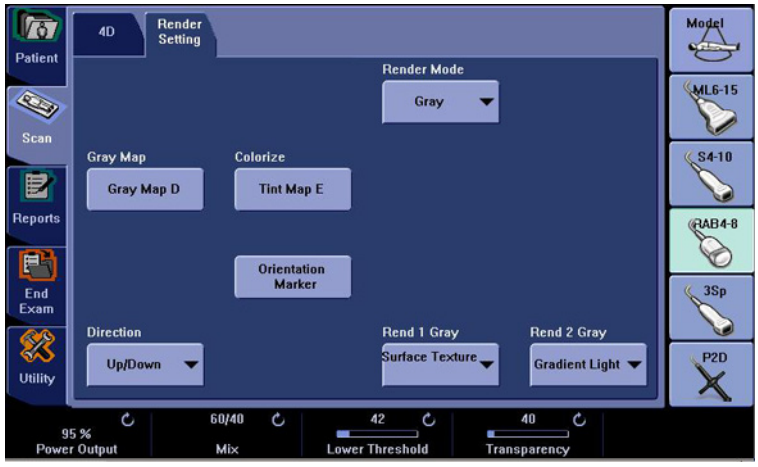



Figure 5-85. Render Setting Tab (4D Data Acquisition)

Table 5-23: 4D (Data Acquisition) Render Parameters

| 4D Parameter | Description |
|---|---|
| Direction | The ROI determines the region that is rendered during 4D acquisition. You can change the direction in which this ROI is viewed. Selections: **Up/Down**, **Down Up**, **Left/Right**, **Right/Left**, **Front/Back**, **Back/Front**. |
| Gray Map | Displays the gray map selections on the display monitor. Select maps using the **Trackball**. |
| Colorize | Displays the tint map selections on the display monitor. Select maps using the **Trackball**. |
| Render Mode | Select Gray or Inversion. If you select Inversion, inverts the gray values of the rendered image (e.g., image information that was black becomes white and vice versa). |

Table 5-23: 4D (Data Acquisition) Render Parameters (Continued)

| 4D Parameter | Description |
|---|---|
| Render 1 / Render 2 | Allows you to combine render mode values from render mode 1 and render mode 2. Select the render map combination from the upper-left portion of the monitor display. Select map combinations using the **Trackball**.<br><br>Render Mode 1 Selections: Surface Smooth, Surface Texture, Transp Max, Transp X-ray, Transp Min.<br><br>**Surface Smooth** - Surface displays in a smoothed texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. **Surface Texture** - Surface displays in texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. **Transp Max.** - Displays the maximum intensity of gray values in the ROI. This is helpful for viewing bony structures. **Transp X-Ray** - Displays all gray values in the ROI. **Trans Min.** - Displays the minimum number of gray values in the ROI. This is helpful for viewing vessels and hollow structures.<br><br>Render Mode 2 Selections: Surface Smooth, Light, Gradient Light, Transp Max, Transp X-ray, Transp. Min.<br><br>**Surface Smooth** - Surface displays in a smoothed texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. **Light** - Surface displays in light mode. Structures in the near field are brighter; structures in the far field are darker. **Gradient Light** - Surface displays as if it is illuminated from a spot light source. This is helpful if the displayed surface is surrounded by hypoechoic structures (for example, liquids). **Transp Max.** - Displays the maximum intensity of gray values in the ROI. This is helpful for viewing bony structures. **Transp X-ray** - Displays all gray values in the ROI. **Transp Min.** - Displays the minimum number of gray values in the ROI. This is helpful for viewing vessels and hollow structures. |
| Transparency | Selections: 20 to 250. Sets the transparency of the image. The higher the number, the more transparent the gray scale information. |

### Tomographic Ultrasound Imaging (TUI)

Tomographic Ultrasound Imaging (TUI) is a visualization mode which presents data as parallel slices (planes) through the dataset. This method of visualization is consistent with CT and MRI. The distance between the different planes can be adjusted.

1. Select TUI as the Visualization mode.
2. Press ‘L’ to start acquisition.
3. If in 4D, press ‘R’ to end the acquisition. This step is not required in Static 3D.

   The reference image + the number of specified slices appears. The reference image always displays and indicates which slices you are currently viewing as solid lines.

**Tomographic Ultrasound Imaging (TUI) (continued)**

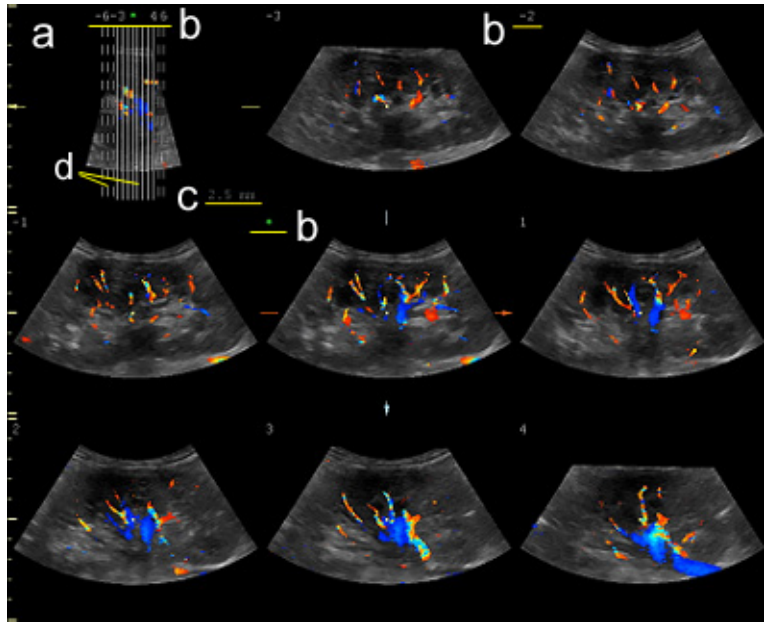



Figure 5-86. TUI 3x3 Example

a. The TUI reference image that shows the slice position. This image is orthogonal to the reference image.

b. The number and green asterisk shows the position of each slice. A green asterisk indicates the center image (A, B or C-plane).

c. Slice distance displays when the slices are in certain intervals.

d. A solid line indicates the slice appears on the monitor.

   A dotted line indicates the slice did not appear on the monitor.

*NOTE: TUI with Color is only available with Static 3D, not with 4D.*

**Tomographic Ultrasound Imaging (TUI) (continued)**

4. Adjust the number of slices and slice distance.

   You can adjust the number of slices by using the ***Slices*** rotary. You can adjust the distance between the slices using the ***Slice Distance*** rotary. Max value is 40mm.

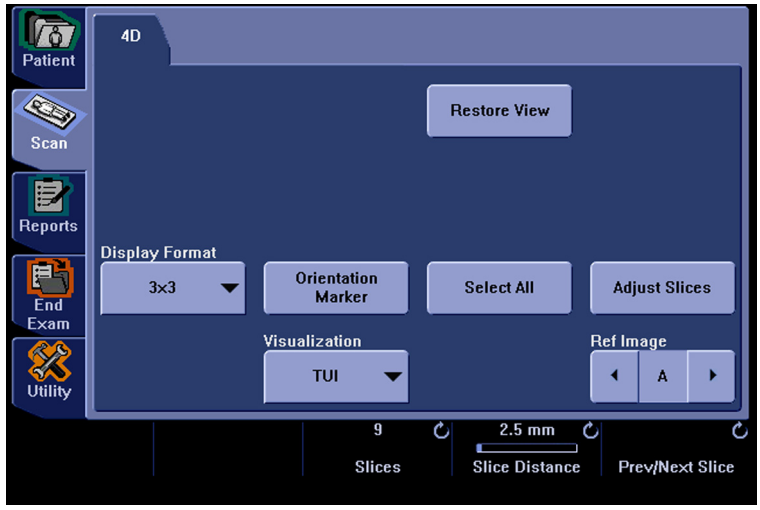



Figure 5-87. TUI touch panel

- Move forward/backward through the slices via ***Prev./ Next Slice***.
- Change the center image via ***Ref. Image*** if needed (Reference image A, B or C).
- Select ***Display Format*** from 1X1, 1X2, 2X2 and 3X3.
- For Anatomical Marker, please refer to ‘Anatomical Markers in 4D’ on *page 5-244*.
- The following features are supported in TUI: Zoom, Rotation (X/Y/Z), Trackball (Move the position), Translation and Gain.
- To hide the color, select ***Color Off*** from the touch panel.

**Tomographic Ultrasound Imaging (TUI) (continued)**

You can adjust each slice position with ***Adjust Slices***.

1. Press ***Adjust Slices*** on the touch panel.
2. The pointer displays. Select a slice by using the **Trackball**.

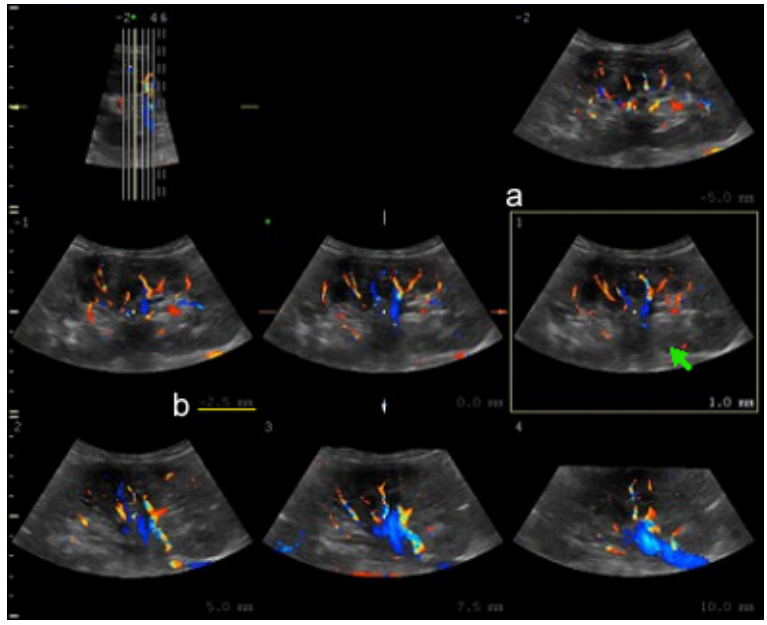



Figure 5-88. Adjust Slice screen (example)

a. Selected slice displays with yellow border
b. Distance from the center image

- Adjust the slice distance from the reference image by using ***Slice Position***. Slice Position only affects the selected slice.

*NOTE: If you place the pointer on the reference image and rotate **Slice Position**, the position of the reference image and all slices are moved.*

- Adjust the number of right and left slices off the center image by using ***Left Slices*** or ***Right Slices***.

3. After the adjustment is finished, press **Set**. The slice is marked with an “X”. To print this slice, press a print key.

### Anatomical Markers in 4D

Anatomical markers are available in 4D.

To add an anatomical marker in 4D,

- Rotate the Body Pattern/Ellipse key. A person pattern overlays the 4th quadrant on the display.

To change the person pattern,

- Press the touch panel key. From left to right, select either Transrectal, Neonatal Head, Face (down), or Face (up).

To rotate the person pattern,

- Rotate the Body Rotation touch panel key (0, 45, 90, 135, 180, 225, 270, or 315 degrees).

To tilt the probe,

- Rotate the Probe Tilt touch panel key (0, 45, 90).

To align the marker with the probe's orientation marker.

- Rotate the Body Pattern/Ellipse key.

To position the marker on the anatomy,

- Move the Trackball to position the marker at the appropriate anatomy.

The display is also annotated, for example:

- Cr = Cranial
- Ca = Caudal
- A = Anterior
- P = Posterior
- L = Left
- R = Right

To exit Anatomical Markers:

- Press the **Set** key.

## Manipulating the Volume of Interest (VOI)

Imagine you are able to manipulate the 4D volume of interest (VOI) in your hand. The 3D/4D ROI is a tangible anatomical object that you can see and manipulate easily using the **Trackball** and other control panel keys.

If the monitor display is in Sectional view, select the desired reference image before you manipulate the image.

*NOTE: The manipulation examples are with A set as the reference image.*

### Rotating the 4D VOI Left/Right or Forward/Backward

You can rotate the VOI around the X, Y, and Z axes. To rotate the VOI around the X axis, turn the **CF** left/right.

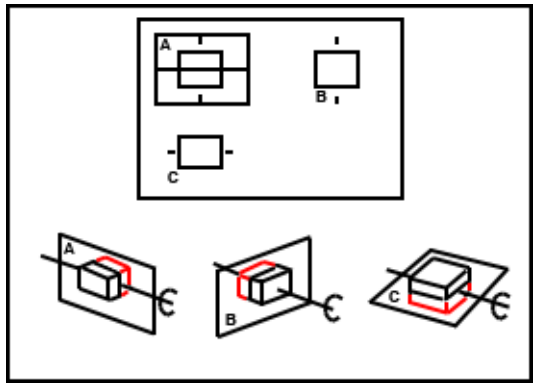



Figure 5-89. Rotate about X Axis with CF Control

## Manipulating the Volume of Interest (VOI) (continued)

To rotate the VOI around the Y axis, turn the **PW** left/right.

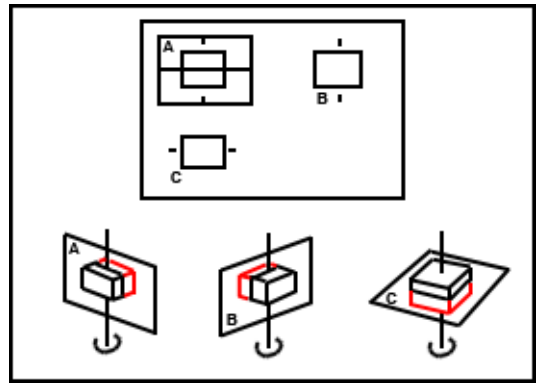



Figure 5-90. Rotate about Y Axis with PW Control

**Rotating the 4D Image in a Circular Motion**

To rotate the VOI around the Z axis, turn the **M** left/right.

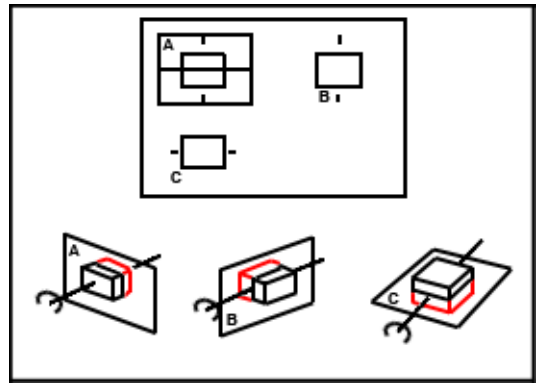



Figure 5-91. Rotate about Z Axis with M Control

*NOTE: To speed up the rotation, press the **PW**, **CF**, or **M** controls before you turn them. To slow down the rotation, press **PW** or **CF** again.*

## Manipulating the Volume of Interest (VOI) (continued)

| | |
|---|---|
| **Moving through the VOI** | To move through the image to view a particular slice, press **Depth**.<br><br>This allows a displacement of the center of rotation along the intersection lines of the sectional planes A, B, and C. The displacement of the center of rotation leads to the display of parallel sectional images. See ‘Reference Images’ on *page 5-215 for more information.* |
| **Zooming the Image** | Rotate **Zoom** to zoom on the image. |
| **Moving the VOI Position** | To move the position of the VOI, move the **Trackball** left, right, up and down, as needed. |
| **Resizing the VOI** | To re-size the VOI, use the **Width** control panel button. See the Width section in this chapter. |

## Stopping 4D Image Acquisition

To stop acquiring a 4D image, press **Freeze** or R if you are in Render view or just **Freeze** if you are in Sectional view.

## 4D VOI Post-Processing

When you press **Freeze** or **R**, one of the following touch panel displays, depending on whether you are in Render view or Sectional view.

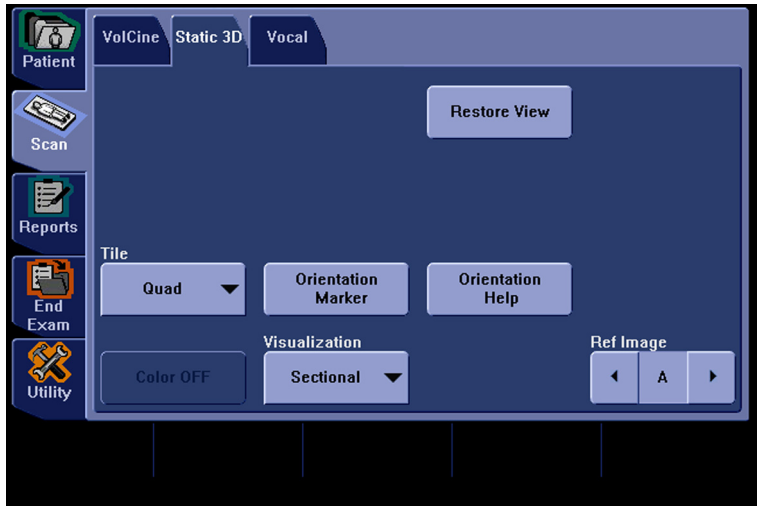



Figure 5-92. 4D (After Acquisition) touch panel - Sectional View

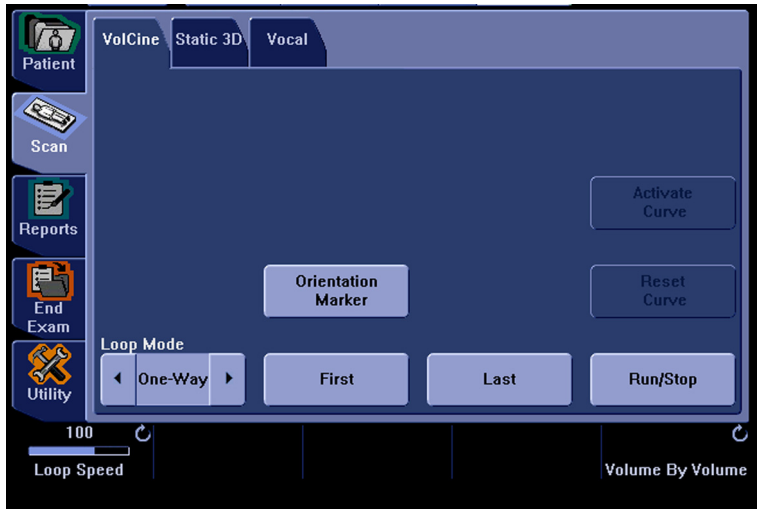



Figure 5-93. 4D (After Acquisition) touch panel - Sectional View

### Volume CINE

The system constantly stores CINE images so you can play back and review those images. CINE is useful for focusing on images during the specific part of the heart cycle or to view short segments of a scan session.

To activate CINE in 4D:

1. Press **Freeze.**
2. Select the **VolCine** tab.

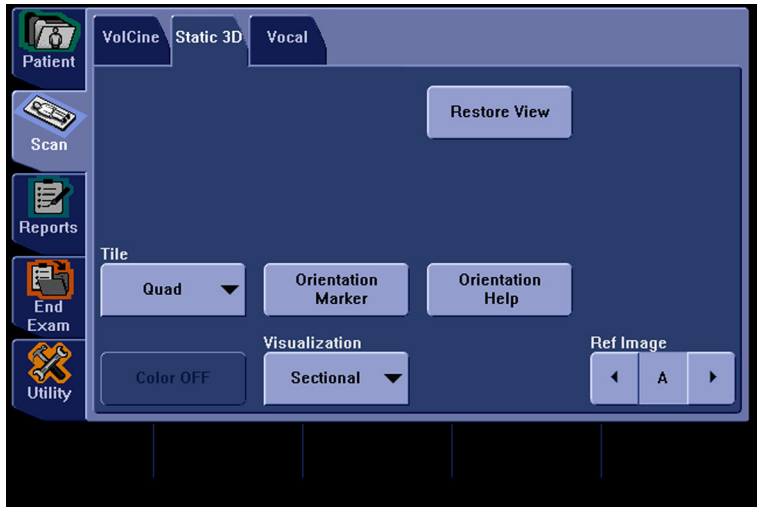



Figure 5-94. 4D Volume Cine

Table 5-24: 4D Cine Parameters

| Preset Parameter | Description |
|---|---|
| Loop Mode | Selections include: One Way, BiDirectional (two-way). **One Way** - plays one loop sequence forward. **BiDirectional** - plays the sequence forward and backward. |
| First | Displays the first volume in the CINE loop. |
| Last | Displays the last volume in the CINE loop. |
| Run/Stop | Starts and stops the CINE loop. |
| Loop Speed | Adjusts the CINE loop speed. |
| Volume by Volume | Used to select an individual volume in the CINE loop. |

**Volume CINE (continued)**

3. If you were in Render visualization mode when you entered 4D CINE mode; press **L** to return to Pre-Mode.

   If you were in Sectional visualization mode when you entered 4D CINE mode; press **L** to return to Pre-Mode.

4. To re-start real-time 4D acquisition, press **Freeze**.

### Static 3D

You can create a single sweep, single volume static 3D image.

### Performing a Static 3D Scan

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.
2. Select a 4D probe from the probe indicator.
3. Obtain a 2D image. Optimize the image as usual.
4. Press **3D/4D**.
5. Press ***Static 3D***. Set Visualization to Render.
6. Set the Volume of Interest (VOI) to be rendered. Use the **Trackball** to move the VOI and **Width** to re-size the ROI.
7. Adjust the volume angle. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a high volume rate.
8. Set the probe down on the patient, making sure the probe is held steady. Press the **L** key to start acquisition.

*NOTE: During 3D acquisition, no control panel keys are not available, except for 'R.'*

*NOTE: When the 3D acquisition begins, the touch panel appears blank for a brief moment.*

9. Hold the probe steady until the system stops automatically. You will know the acquisition has stopped when the **touch panel** changes to display the Render Setting, 3D Rotational Cine, and Scalpel tabs.

   To stop the acquisition manually, press the **R** key.
10. Save the image.
11. To further manipulate the 3D image, press ***Static 3D***.

    The touch panel that displays depends on the visualization mode selected prior to freeze, Sectional, Render, TUI or VCI Static.

### Static 3D Sectional View

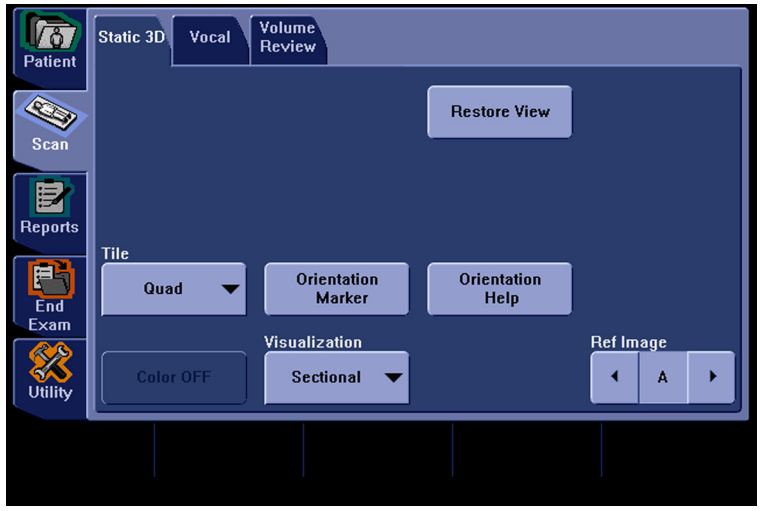



Figure 5-95. 3D (After Acquisition) touch panel - Sectional View

Table 5-25: 3D After Acquisition Parameters - Sectional View

| Preset Parameter | Description |
|---|---|
| Orientation Help | Displays a 3-dimensional drawing to illustrate the orientation. Only displays in sectional view. |

### Static 3D Render View

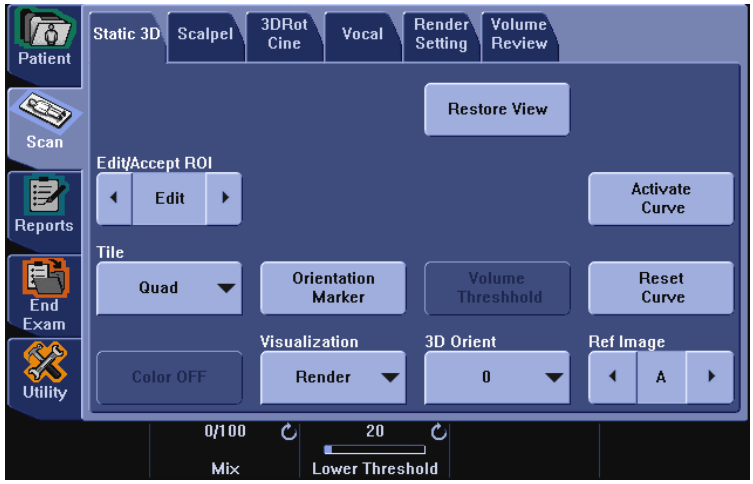



Figure 5-96. 3D (After Acquisition) touch panel - Render View

Table 5-26: 3D After Acquisition Parameters - Render View - Page 1

| Preset Parameter | Description |
|---|---|
| Edit/Accept ROI | Selections include Edit, Accept. **Edit** - Select to adjust the size of the Region of Interest (ROI). **Accept** - accepts the active 3D image. |
| 3D Orient | When selected, changes the orientation of the image on the monitor display. Selections include: 0 degrees, 90 degrees, 180 degrees, and 270 degrees. |

### VCI Static

#### Introduction

VCI (Volume Contrast Enhanced Ultrasound) allows you to sweep smaller slices of data with a higher volume rate. The resulting image shows an average, integrated gray value of the tissue contained within the ROI. VCI improves the contrast resolution and signal/noise ratio. It also reduces image speckle. This may facilitate finding diffuse lesions in organs.

#### touch panel

The data is represented as in Static 3D - Sectional Planes. However, the three planes are VCI renderings (tissue information of a thick slice) computed from the 3D dataset.

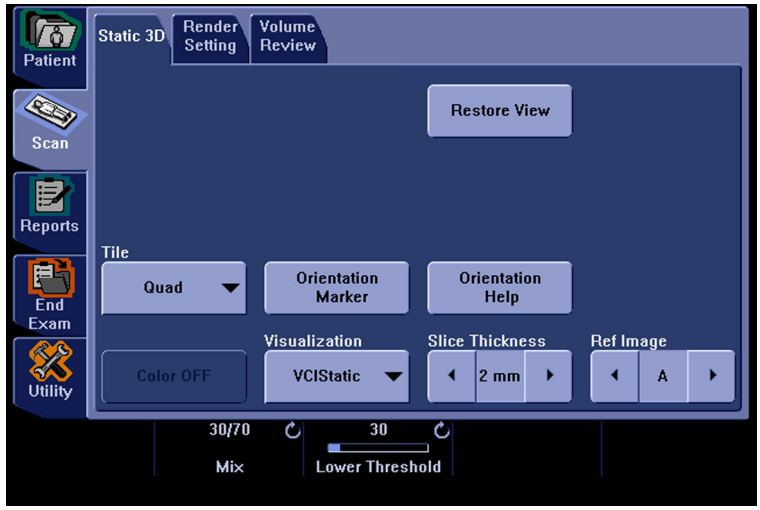



Figure 5-97. 3D (After Acquisition) touch panel VCI Static

Table 5-27: VCI Static View

| Preset Parameter | Description |
|---|---|
| Slice Thickness | Select the slice thickness |

### Static 3D Color

To view Static 3D Color,

1. Acquire the anatomy you want to view in B-Mode.
2. Activate Color Flow or PDI.
3. Activate 3D/4D. The Pre-3D displays. Select the desired Visualization.

*NOTE: 4D cannot be selected from Pre-Mode with Color active.*

4. Press ‘L’ to render the image.

The color is rendered. You can adjust the Render Mode (default is Glass Body):

- **Gray**. Gray, no color.

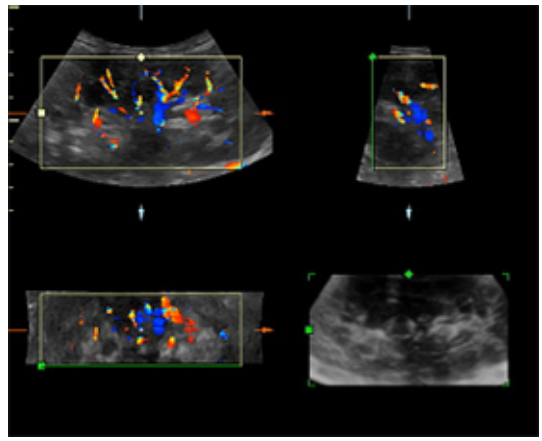


Figure 5-98. 3D Color - Gray

- **Inversion**. Inverts the grayscale.

**Static 3D Color (continued)**

- **Color**. Displays Color-Flow.

  Select the rendering method ([Rend Color1] (Surface only) or [Rend Color2]) and the mixing ratio.

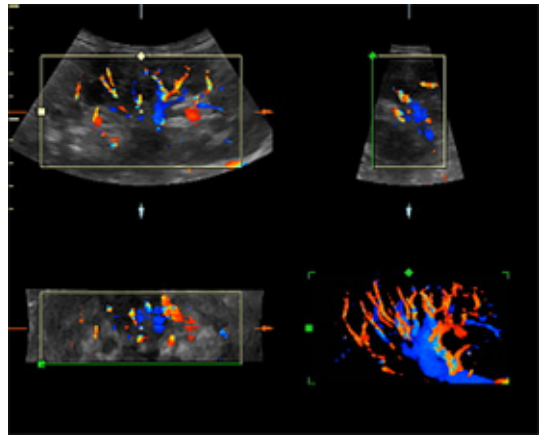


Figure 5-99. 3D Color - Color

- **Glass Body**. Displays both Color-Flow and B-Mode.

  Select the rendering method ([Rend Gray] or [Rend Color]) and the mixing ratio.

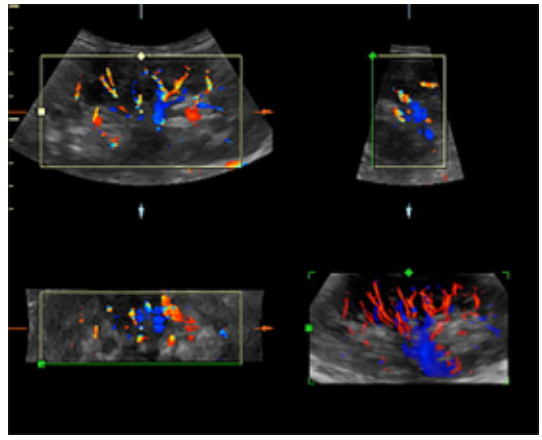


Figure 5-100. 3D Color - Glass Body

To hide the color on the sectional planes, select ***Color Off*** from the touch panel.

*NOTE: If you scan in Render mode and select Tile as Quad, you can hide the color with the Color Off touch panel key.*

**Volume Review**

You can post process VOI (the entire volume of interest) and scroll through acquisition planes via Volume Review. This allows you to review all of the frames within this volume set.

In Volume Review, start in Run/Stop so that every frame in the volume is displayed.

*NOTE: If you adjust the screen while in Volume Review, these changes ARE NOT reflected on the Static 3D volume.*

### Scalpel

Scalpel allows you to edit/cut sections of a 3D image. Scalpel is available only on a rendered image.

1. Press ***Scalpel***.

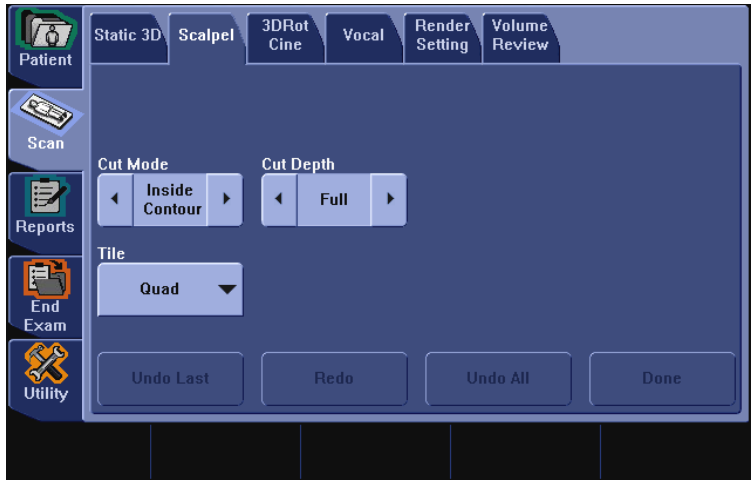



Figure 5-101. Scalpel

Table 5-28: Scalpel Parameters

| Preset Parameter | Description |
|---|---|
| Cut Mode | Selections: Inside Contour, Outside Contour, Inside Box, Outside Box, Eraser Big, Eraser Small. **Inside Contour, Outside Contour** - Allows you to trace the portion of the image you want to cut. Trace Outside removes all portions of the image that fall outside your traced region. Trace Inside removes all portions of the image that fall inside your traced region. **Inside Box, Outside Box** - Displays a box you can use to define the portion of the image you want to cut. Outside Box removes all portions of the image that fall outside the box. Inside Box removes all portions of the image that fall inside the box. **Eraser Big, Eraser Small** - Provides a big and small eraser tool you can use to define the portion of the image to cut by hand. Available only if Depth is Full. |
| Cut Depth | Selections: Full, Define. **Full** -The entire depth of the selected region will be cut. **Define** - Allows you to define the depth to cut using the Depth control panel knob. |
| Undo Last | Undoes the last cut only. |
| Redo | Select to redo scalpel. |

Table 5-28: Scalpel Parameters (Continued)

| Preset Parameter | Description |
|---|---|
| Undo All | Undoes all cuts since you entered Scalpel mode. |
| Done | Applies to User Defined Cut Depth when complete. |

2. Select the cut mode.
3. Use the **Trackball** and **Set** key to define the portion of the image to cut. Press **Set** to start, move the **Trackball** to define the region, then press **Set** again to cut the image. The portion is removed.

   To undo the last cut, select ***Undo Last***.

   To undo all cuts in the current session, select ***Undo All***.

*NOTE: With the cut image displayed, if you attempt to switch to the Static 3D tab to edit the ROI, the following warning message appears: Scalpel changes will be lost. Do you want to continue? [Yes/No].*

### 3D Rotation CINE

3D Rotation CINE allows you to view the 3D image from various angles.

To activate rotation CINE in 3D:

1. Press **Freeze.**
2. Select the 3DRot Cine tab.

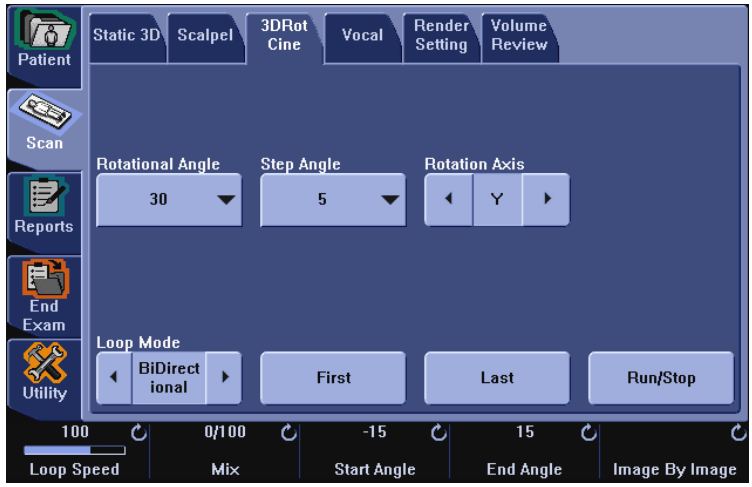



Figure 5-102. 3D Rotation

Table 5-29: 3D Rotation Cine Parameters

| Preset Parameter | Description |
|---|---|
| Rotational Angle | Sets the rotational angle of the 3D image over which the CINE loop is played. Typical values are 30, 45, 60, 90, 180 and 360 degrees. |
| Step Angle | Sets the step angle between individual frames in the CINE loop. |
| Rotation Axis | Sets the axis about which the CINE loop is calculated. Selections X and Y. |
| Loop Mode | Selections include: One Way, BiDirectional (two-way). **One Way** - plays one loop sequence forward. **BiDirectional** - plays the sequence forward and backward. |
| First | Displays the first volume in the CINE. |
| Last | Displays the last volume in the CINE. |
| Run/Stop | Starts and stops the CINE sequence. |

Table 5-29: 3D Rotation Cine Parameters (Continued)

| Preset Parameter | Description |
|---|---|
| Start Angle | Used to select the starting angle in the CINE loop range. The default Start Image is calculated from the rotational angle as: -1 X Rotational angle / 2 If you adjust the Start Image, the Rotational Angle is re-set to be the value of the adjusted Start Image. |
| End Angle | Used to select the ending angle in the CINE loop range. The default End Image is calculated from the rotational angle as: Rotational angle / 2 If you adjust the End Image, the Rotational Angle is re-set to be the value of the adjusted End Image. |
| Image by Image | Used to select an individual image in the CINE loop. |

### VOCAL

You use VOCAL (Virtual Organ Computer-aided Analysis) to visualize and calculate the volume of anatomical structures, such as a tumor lesion, cysts, and the prostate. VOCAL is available after a Static 3D or Real-Time 4D acquisition.

1. Press ***Vocal***. Specify the volume calculation method (***Manual***, ***Contour Detect***, ***SemiAuto Detect***, or ***Sphere***). Select the reference image you want to use to perform the trace by selecting ***Ref Image*** A, B, or C. Press ***Start***.
2. Trace the anatomy using the **Trackball**. Press **Set** to start and end the trace. You must go across the dotted line for the trace to take effect (it turns yellow). The trace is performed on each image slice, separated by the rotational step angle. Rotate the ***Rot. Ref*** dial until you have completed the total of the required rotations (for example, if you've selected 30 degrees, you need to complete six traces if you've selected Manual). After you've completed the trace target, the ***Calc Volume*** button is active for you to press. The calculated VOCAL image appears in the lower, right-hand corner of the display. You are now in the edit state.

*NOTE: Trace not used for Sphere. For Sphere, set the Poles.*

3. Edit as necessary. You can apply a shell, adjust its thickness, navigate through the reference angles, or restart the VOCAL.

**VOCAL (continued)**

VOCAL touch panel states are described in the following tables.

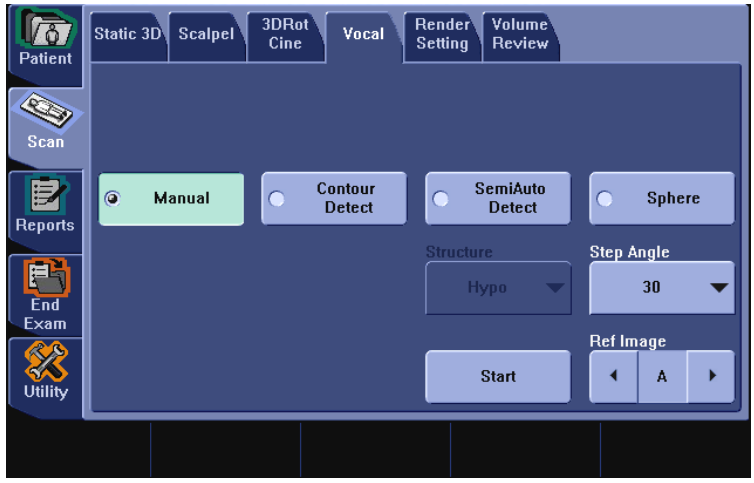



Figure 5-103. VOCAL Setup touch panel

Table 5-30: VOCAL Parameters on Setup touch panel

| Parameter | Description |
|---|---|
| Manual | When you select the Manual method, you need to perform a manual trace on each of the rotation angles. |
| Contour Detect | When you select the Contour Detect method, you need to perform a manual trace on each of the rotation angles. |
| SemiAuto Detect | When you select the Semi Automatic Detect method, you need to perform a trace on only two rotation angles. The system applies an algorithm to define the traces. |
| Structure | Structure is only available with the SemiAuto Detect method. Select Hypo, Cystic, or Hyper/Iso. |
| Sphere | Calculates the volume based on the pole settings. |
| Pole 1 | Adjust the upper contour point (green arrow) of the structure. |
| Pole 2 | Adjust the lower contour point (green arrow) of the structure. |
| Rotational Step Angle | Specify the angular spacing between contour traces. Typical values are 6, 9, 15, and 30 degrees. The number of planes varies by this formula: 180 degrees / selected rotational step angle. |

Table 5-30: VOCAL Parameters on Setup touch panel (Continued)

| Parameter | Description |
|---|---|
| Ref Image | Use this to select the image you want to use to perform the trace. |
| Start | Press Start when you're ready to perform the trace. |
| Rot.Ref #/# Back/ Next | Select Next/Back to move to the next image for contour definition in the rotation step. |

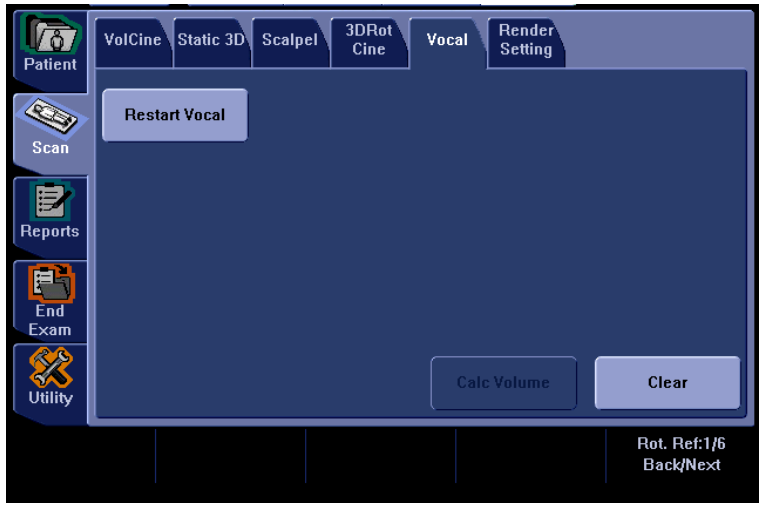



Figure 5-104. VOCAL Calculate Volume touch panel

Table 5-31: VOCAL Calculate Volume touch panel

| Parameter | Description |
|---|---|
| Calc Volume | Press Calc Volume to initiate the VOCAL image calculation. |
| Clear | Press Clear to remove the trace from the image. |
| Restart Vocal | Press Restart Vocal to return to the initial VOCAL state. |

**VOCAL (continued)**

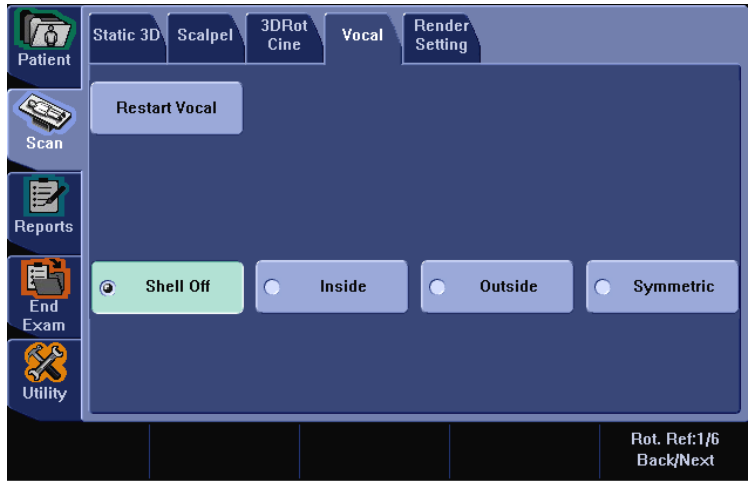



Figure 5-105. VOCAL Edit touch panel

The Shell Modes allows you to construct a shell or contour “around” the structure of interest, which enables you to distinguish between the contour of the targeted structure and the contours the inside and outside of the structure.

Table 5-32: VOCAL Parameters on Edit touch panel

| Parameter | Description |
|---|---|
| Shell Off | Select Shell Off if you do not want a shell around the VOCAL image. |
| Inside | Select Inside if you want a shell inside the volume. |
| Outside | Select Outside if you want a shell outside the volume. |
| Symmetric | Select Symmetric if you want half of the shell thickness inside and half outside the volume’s perimeter. |
| Shell Thickness | Adjust to vary the thickness of the shell. |

### Static 3D Render Setting

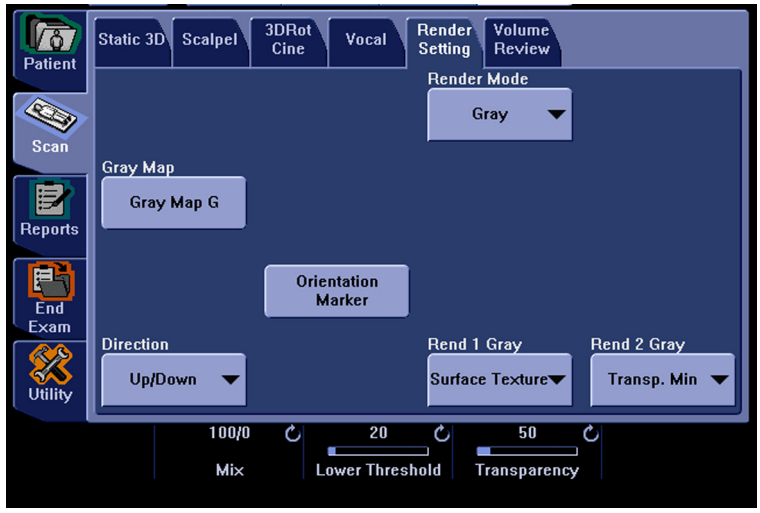



Figure 5-106. Static 3D Render Setting

### Static 3D Volume Review

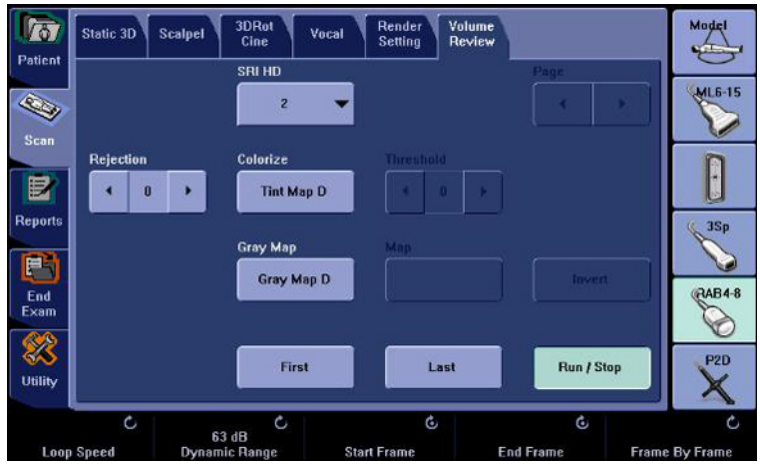



Figure 5-107. Static 3D Volume Review

## Storing 4D Images

You store 4D images exactly as you would your 2D images. Because 4D images contain more data, they also require more space. Pay close attention to the size of the volumes.

- Still image: Store as Raw Data
- CINE: Store as DICOM

# *Chapter 6*

# Scanning/Display Functions

*Describes additional ways in which to adjust the image. In addition, describes ways to get useful information electronically.*

# Zooming an Image

## Introduction

Zoom is used to magnify a zoom region of interest (ROI). The system adjusts all imaging parameters accordingly. You can also zoom frozen images.

To zoom an image, turn the **Zoom** to the right. A reference image appears in the lower, left-hand section of the display.

To exit zoom, turn the **Zoom** to the left until the reference zoom image is removed or press B-Mode.

Reference Image is the small un-zoomed image displayed next to the zoomed image.

## Bioeffect

Zooming an image changes the frame rate which tends to change thermal indices. The position of the focal zones may also change which may cause the peak intensity to occur at a different location in the acoustic field. As a result, the MI (TI) may change.

Observe the output display for possible effects.

## Read vs. Write Zoom

### Read Zoom

To activate Read Zoom, turn the **Zoom** knob.

Read Zoom magnifies the display of the data without making any changes to the ultrasound image data that is acquired.

Available in a live, frozen, cine or recalled raw data image.

### Write Zoom

To activate Write Zoom, press the **Zoom** knob.

With Write Zoom, the Ultrasound line density and/or sampling frequency increases, giving a better resolution.

Available only in pre-processing.

You can preset the write zoom window size (height and width) on Utility -> Imaging -> B-Mode.

*NOTE: The difference between Read Zoom and Write Zoom can be described in relation to photography. With a photograph, Read Zoom manipulates the negative and enlarges the picture; whereas Write Zoom uses a telephoto lens to bring the image closer before taking the picture.*

HINTS

First use the Read Zoom (turn knob) to get to the area of interest, then use Write Zoom (press knob).

# Split Screen

## Overview

LOGIQ S7 Expert/Pro supports the following multiple image format:

- Dual (split the window area into 2 areas)
- Wide Dual (split the window area into 2 areas, but wider than the normal dual)
- Quad (split the window area into 4 small areas)

  This is useful, for example, when measuring AFI.
- Simultaneous

## Dual/Quad

To activate a dual split screen, press ***L*** or ***R***.To activate a quad display, press and hold down ***L***.

When you activate Split Screen by pressing ***L***, the single image is placed on the left side; when you activate Split screen by pressing ***R***, the single image is placed on the right side.

To switch between active images, press ***L***/***R***.

To deactivate, press ***R*** until the screen changes.

*NOTE: To put a copy of the image on the opposite side when entering dual split screen, use the "When Entering Dual Image" preset found on Utility --> Application --> Settings preset page.*

## Simultaneous mode

While using CFM or PDI, press the L and R keys simultaneously to display B and B+CFM, or B and B+PDI in real-time on the left and right side.

It is useful to observe the ROI in B-Mode.

## Dual Caliper

In split screen, you can draw a caliper, area, ellipse, or spline trace on both the left and right image at the same time. Whichever side of the screen that you annotate is called the “Original” graphic. The copy is called the “Shadow” graphic.

This feature is available in the following modes:

- B-Mode:B-Mode
- Color Flow Mode:Color Flow Mode
- B-Mode:Color Flow Mode
- Simultaneous Mode.
- Contrast
- Elastography

*NOTE: Dual Caliper IS NOT available in B-Mode: B/PW Mode or in B-Mode:B/M Mode, or with different probes.*

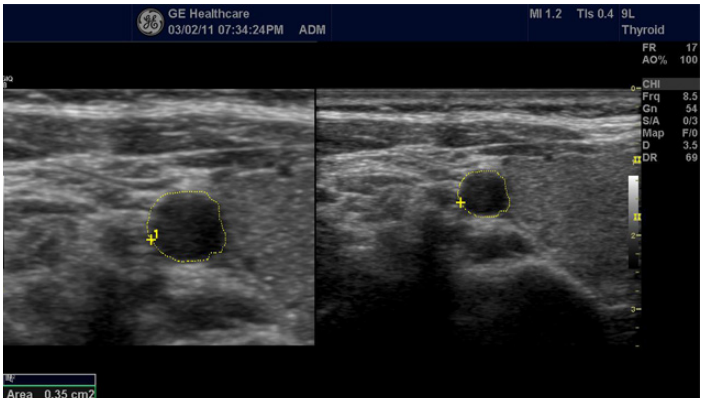



Figure 6-1. Original (Left), Shadow (Right)

**Dual Caliper (continued)**

*NOTE: Only the Original graphic contains the graphic numbering. In this way you can always distinguish between the original and the Shadow graphic.*

*NOTE: You can only edit the Original graphic; however, when you do edit the Original graphic, the Shadow graphic is also edited at the same time.*

*NOTE: If you delete either graphic, both are deleted.*

*NOTE: When a measurement is selected without Dual B-Mode images or with different probe images, a warning message is displayed on the status bar and the selected measurement is cancelled.*

*NOTE: If the first point of the original graphic is out of the shadow image area, then the warning message displays on the status bar and the shadow graphic is not drawn.*

*NOTE: The Trackball move area is limited to the narrow area of both images.*

*NOTE: You cannot take a measurement across dual images.*

*NOTE: The 2D Dual measurement tool cannot be copied.*

## Dual Caliper (continued)

### Dual caliper for 2D image

2D Dual Caliper / 2D Dual Area / 2D Dual Ellipse / 2D Dual Spline Trace / 2D Dual Circle are not available through the factory default. To enable these measurements, add a new measurement using “2D Dual Caliper”, “2D Dual Area”, 2D Dual Ellipse”, “2D Dual Spline Trace” or “2D Dual Circle” tool in the Utility--> Measure--> M&A preset menu.

1. Select Blank from Add measurement.

Figure 6-2. Add Measurement

2. Select appropriate dual caliper tool from Tool drop-down menu.

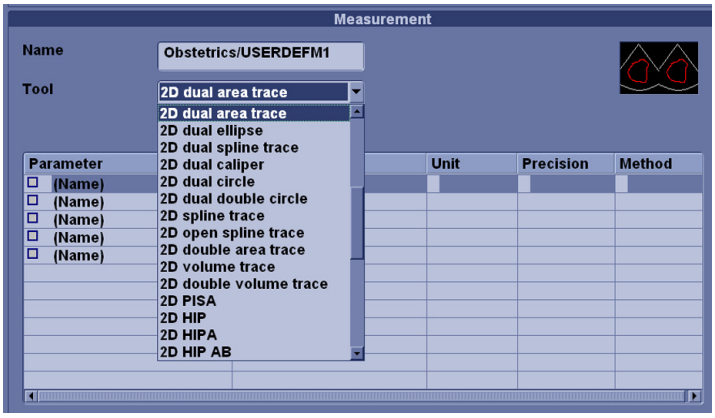



Figure 6-3. Drop-down menu

# Freezing an Image

## Introduction

Freezing a real-time image stops all movement and allows you to measure and print the image.

*NOTE: While the image is frozen, all Power Output is suspended.*

*NOTE: Selecting a new probe unfreezes the image*

## Freezing an image

To freeze an image,

1. Press **Freeze**. The key turns green.

If you are in a mixed mode, both screen formats stop immediately. Deactivating Freeze restarts both modes and places a black bar on the trace to indicate the time discontinuity.

To reactivate the image,

1. Press Freeze again.

*NOTE: Deactivating Freeze erases all measurements and calculations from the display (but not from the worksheet).*

Use the Trackball to start CINE after pressing Freeze.

## Post processing

You can use the following controls to process a frozen B-Mode image.

- Map
- Zoom
- Rotation
- Reverse
- Rejection
- Dynamic Range
- Gain
- SRI
- TGC
- Edge Enhance

You can use the following controls to process a frozen Color Flow or Doppler Mode image.

- Angle Correct
- Invert
- CF
- Threshold
- Compression (PW, CW), Dynamic Range (CF)

*NOTE:* *Color cannot be added to a black and white image that has been frozen.*

- Map Compress/Map/Transparency Map
- Baseline
- Colorize
- Gray Map
- Sweep Speed
- Display Format
- Auto Angel/ Quick Angle
- Auto Calcs
- Trace Sensitivity/Trace Direction/Trace Method,
- Cycles to Average

Auto Optimize. Optimizes the B-Mode image or Doppler Spectrum.

# Using CINE

## Introduction

CINE images are constantly being stored by the system and are available for playback or manual review via CINE.

Timeline data is continually stored at four times the display width of time line data (and updates the corresponding B-Mode images).

You can view CINE as a continuous loop via CINE Loop or manually review CINE images frame by frame via the Trackball.

Data in CINE is available until new data is acquired. CINE is stored on the system's memory and can be archived as well.

CINE is useful for focusing on images during a specific part of the heart cycle or to view short segments of a scan session.

## Activating CINE

To activate CINE,

1. Press Freeze.
2. Move the Trackball.

## CINE gauge and Monitor Display

The CINE gauge (located on the right-hand side of the monitor) indicates which frame you are viewing of the whole loop (62:123), as well as the time at which this frame occurs within the loop (1.6:3.2 s).

*NOTE: The CINE gauge turns green when a Prospective CINE Clip is pending.*

## Using CINE

The following touch panel appears:

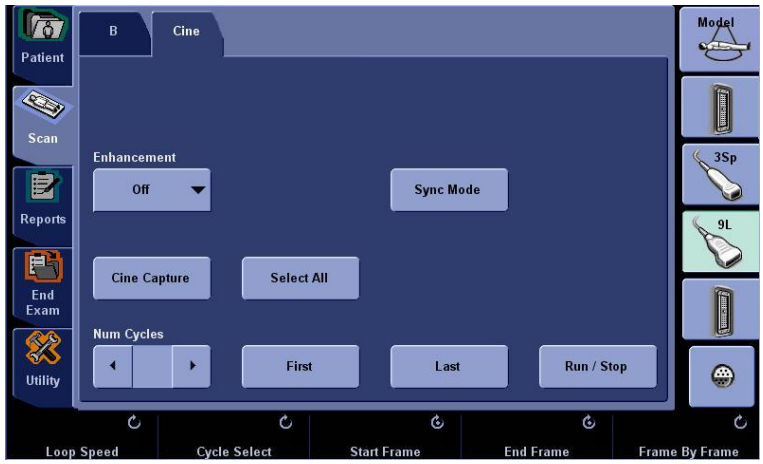



Figure 6-4. Cine touch panel

Table 6-1: Cine touch panel description

| Parameter | Description |
|---|---|
| Cine Capture | Searches through all images between the start frame and end frame and displays each peak or the highest velocity/tissue power. |
| Select All | Select all frames of the cineloop. |
| Sync Mode | Phase synchronizes multiple CINE Loops. |
| Num Cycles | Control the number of heart cycles to be included in the CINE Loop. |
| First | Move to the first frame of cineloop. |
| Last | Move to the last frame of cineloop. |
| Run/Stop | Start/Stop the cineloop review. |
| Loop Speed | Adjust the CINE Loop playback speed. |
| Cycle Select | Select the heart cycle to review. |
| Start Frame | Select the start frame. |
| End Frame | Select the last frame. |
| Frame by Frame | Review the CINE image frame by frame manually. |

Table 6-1: Cine touch panel description

| Parameter | Description |
|---|---|
| Enhancement | Execute the enhancement to the Cine capture image. Select Off, Shade FW, Shade Rv, Enhance1, Enhance2 or Enhance3. |

### Cine Loop Start/Stop

1. Press **Freeze**.
2. Rotate the **Trackball** horizontally to display the CINE Loop.
3. Select ***Run/Stop*** to playback the loop.
4. Select ***Run/Stop*** again to stop the CINE Loop.

### Select the start/end frame

1. Rotate Start Frame clockwise/counterclockwise to select the start frame.
2. Press Start Frame when the frame shown is the desired start frame.
3. Rotate End Frame clockwise/couterclockwise to select the end frame.
4. Press End Frame when the frame shown is the desired end frame.

### Synchronize CINE Loops

1. Recall stored cine loop to right side of dual screen.
2. Recall same cine loop to left side of dual screen.
3. Change visualization of left side image
4. Select ***Sync mode*** to start the synchronization.

*NOTE: This is useful for Hybrid Contrast to display and check Contrast and Hybrid Contrast for example.*

### Storing / Recalling CINE Loops

To store a CINE Loop, press ***Run***, then press ***P1***. CINE Loops stored on the Clipboard are indicated with a movie strip icon.

To recall a CINE Loop, click on the loop on the clipboard.

## Cine Mode Selection

To scroll the B-Mode CINE Loop only, toggle the top Trackball key and select ***Scroll B***.

To scroll the Timeline CINE Loop only, toggle the top Trackball key and select ***Scroll D***.

### Velocity Scale with B-Mode Only

If you review the B-Mode CINE Loop while in Doppler Mode with the Timeline using Scroll B, the Velocity Scale displayed with the Timeline is for the time phase of the currently-displayed B-Mode image, NOT for the time phase of the acquired Doppler Spectrum.

Check the velocity value with the measurement function if you review the CINE Loop using Scroll B. Note that there may be a discrepancy between the velocity scale displayed and the velocity measured using the measurement function.

## Mark CINE

Mark CINE is used to create a Mark CINE at the start of a CINE Loop to be stored or reviewed.

The Mark CINE control on the Trackball key is available while live scanning in non-timeline modes (B-Mode and Color Flow Mode). You activate Mark CINE via the Utility -> Application -> Print Control screen.

When you press Mark CINE, the current image frame is noted. If you subsequently use one of the Print keys while continuing to live scan, the resulting CINE Loop that is stored starts at the Mark CINE. Instead, if you subsequently Freeze the image, the CINE Start Frame is set to the Mark CINE. Pressing the Run key starts the Loop running with the Mark CINE as the first frame.

*NOTE: Selecting Mark CINE when a Mark CINE already exists causes the new Mark CINE to replace the previous one.*

*NOTE: Changing modes or other actions that flush CINE memory causes the Mark CINE to be removed and the image data will not be saved.*

## Retrospective CINE

When you select to store a CINE Loop retrospectively, the system stores cine predetermined time before you press the Print Button, based on the Time Span setting.

## Prospective CINE

When you select to store a CINE Loop prospectively, the system begins storing cine from when you press the Print button, based on the Time Span setting.

*NOTE: The CINE gauge turns green when a Prospective CINE Clip is pending.*

*NOTE: You can cancel Prospective Store by pressing Freeze/Unfreeze or by changing Modes.*

## Preview

Loop Preview can be enabled independently for Time -Based Store, ECG-Based Store, and Mark CINE. This is useful for setting preview preferences based on the application.

*NOTE: The Contrast Time Span setting overrides the Time Span when in Contrast Mode.*

## Background Store

Live Clips are stored in the background to allow you to continue scanning. This works for both Raw Data and for DICOM Loops (with Direct Store On or Off). Image Ordering is preserved with Background Store.

The benefit of Background Store is that clips store with minimal interruption to live scanning.

*NOTE: Background Store IS NOT supported with previously-acquired CINE Loops.*

*NOTE: The system may stop acquisition while storing if CINE memory is at least 80% full. Monitor CINE memory while storing CINE loops to ensure continuous live scanning.*

*NOTE: DICOM loops take significantly longer to store. Storage time may approach or exceed loop time. Allow extra space in CINE memory when saving DICOM loops.*

*NOTE: The CINE gauge turns purple to indicate the section of CINE memory that is being stored in the background.*

## Hints

Setup Tips

- Print Button Setup is now Application specific. When you access Application--> Print Controls, the current Application is the default Application.
- To apply the same Print Control Settings for all Applications, select All Applications as the preset on the Print Controls Menu. Be sure to re-enter values if the field is green.
- Print button setup for the file format and destinations are still configured via the Connectivity Menus.

Usage Tips

- If you select Mark CINE, the next time you press Print completes the Mark CINE Loop Store, independent of its configuration.
- The CINE gauge turns green when a Prospective CINE Clip is pending.
- You can cancel Prospective Store by pressing Freeze/ Unfreeze or by changing Modes.

## Cine Capture

Selecting ***Cine Capture*** searches through all images between the start frame and end frame and displays each peak or the highest velocity/tissue power. Adjust the start frame and end frame points to limit the image frames used in the process.

1. Display the CINE loop which is in memory or recalled from archive.

*NOTE: Cine Capture applies only to 2D images (B, CF, PDI, Contrast, etc.).*

*NOTE: On 2D duplex modes (B/CF, B/PDI, etc.), Cine Capture is not applied to the background B-Mode image, even if the CF/PDI display is turned off.*

2. Run the cineloop.
3. Select ***Cine Capture*** on the touch panel to display the captured image.

   A character 'C' displays on the screen instead of the frame average level.
4. If necessary, save the captured image.
5. Press ***Cine Capture*** again to turn Cine Capture off.

*NOTE: Cine Capture can be used on exported files by using the Save As function. You can save the still image (jpeg) and cine loop (avi) by using Save As.*

*NOTE: Cine Capture does not effect the TIC Analysis.*

## Enhancement

***Enhancement*** executes the enhancement process to the cine capture images.

1. Displays the cine capture image using ***Cine Capture***.

*NOTE: Enhancement applies only to Cine Capture image.*

2. Select ***Enhancement***. A character 'CE' displays on the screen instead of the frame average level.
   - Shade Fw/Shade Rv

     Select Fw (Forward) that brings start frame or Rv (Reverse) that brings last frame of cine to the front.The system has two thresholds for Shade process. Comparison will be made frame by frame after the thresholds have been met. If the two thresholds are satisfied, no comparison will be made with the rest of the frame.

     Using ShadeFw/RV, lower intensity echoes in the near frame will be masked by higher intensity echoes in the far frame. ShadeFw/Rv makes it possible to show lower intensity echoes in the near frame despite the fact that there may be a higher echo projection in the far frame. Therefore, the anteroposterior position of the blood vessel is clearly displayed.

**Enhancement (continued)**

- Enhance1/Enhance2/Enhance3

  The part corresponding to the data of the selected frame is enhanced and superimposed on the entire cine capture images. So You can easily understand the spatial relationships with B-mode image and the flow appearance.

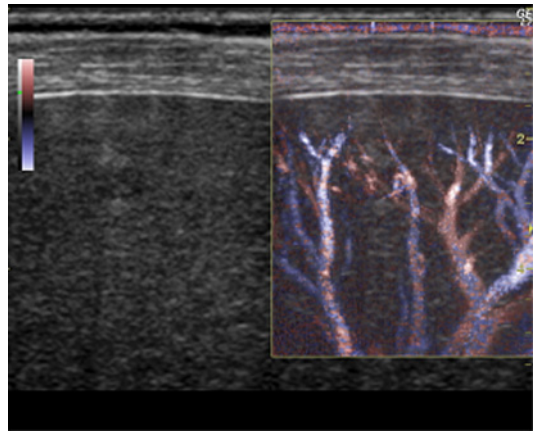


Figure 6-5. Enhancement image example

3. If necessary, save the enhanced image.

*NOTE: You can save the still image (JPEG) and cine loop (AVI) by using Save As.*

# Annotating an Image

## Introduction

The comment function provides the capability to type the comments of free text and/or insert the pre-defined comments from the comment library. It also provides the user with arrow markers to point to parts of the image.

Pressing the **Comment** key or any keys on the alphanumeric keyboard initiates the comment mode. This assigns the trackball function to controlling the cursor and displays the comment library on the touch panel menu.

In comment mode, text can be added by using the comment library or by typing from the alphanumeric keyboard.

Comments can be erased by powering down, when you press ***Clear*** or ***New Patient***, or when preset via Utility -> Comments.

## Introduction (continued)

In addition, the display's home position can be changed (preferred comment area) for each display so that all subsequent comments begin in the same spot.

Pressing the ***F7 (Cursor Home)*** key returns to the user specified position or factory default position.

A new cursor home position is established by placing the cursor in the desired position and pressing ***Shift+Home.***

Comment Mode is activated by pressing the ***Comment*** key. Comment Mode can also be automatically activated by typing from the alphanumeric keyboard.

*NOTE: In this case, the cursor begins at the same location where the comment mode was exited.*

After activating the comment mode, a vertical bar type cursor appears on the screen. Use the ***Trackball*** to move the cursor.

The factory default color for comments is yellow. The color selection can be changed to any of the colors available on the system. The choices are white, yellow, bright red, orange, etc.

*NOTE: The user cannot change the Font Family.*

To indicate a specific comment or text group is selected, the color turns to green. Once the comment is set or fixed, the color returns to yellow or to the user selected color.

*NOTE: If selected "Automatically Set Text" in Utility -> Comment -> Comment, the system sets the comment at the cursor position automatically when text entry is complete.*

To delete comments by character, press the ***Backspace*** key.

To delete all comments and arrow marks, press the ***Clear*** key twice immediately after entering the comment mode.

It is possible to adjust the Focal Zone Number and Position by adding it to the Annotation touch panel in place of the Undo rotary key. To do so, go to ***Utility -> Comments -> Comments*** and add a checkmark next to **Replace Undo Rotary with B Focus Rotary**.

To exit the Comment/Library Comment function, press the next function you wish to do.

To move by words or by text group, press the ***Tab*** key.

## Adding Comments to an Image

### Comment Retention

Comments from the B-Mode images are retained and carried over when switching to multi-image format or duplex mode.

The position of the comments is adjusted so that it is at the same relative position with respect to the display window in the new format as it was in the single image format.

*NOTE: Comments may not be retained when the image is switched to M-Mode image format depending on the preset.*

*NOTE: If selected "Clear Non Active Image Comments" in Utility -> Commnet -> Comment, comments from the non-activated images are automatically cleared when entering to dual or quad image screen.*

*NOTE: Comment Swap button in Comment Mode allows the user to do a quick swap of comments from side to side in dual screen. In other words, the comments on the left image are moved to the right image and vice versa.*

## Arrow Pointers

Arrow pointers can be used by activating the ***F2 (Arrow)*** key on the keyboard or by selecting the **Comment** key and then the top **Trackball** key. When the pointer comes up, it is a GREEN color, indicating it is active and can be moved.

- Move the pointer using the **Trackball** to any place on the screen. The pointer head direction can be controlled by movement of the Trackball or ***Arrow Rotate*** control.
- To readjust the length and thickness of the pointer, use the **Arrow Resize** rotary control. The default for the pointer size can be preset.
- Press **Set** to fix the place of the pointer and direction of the pointer head. The GREEN color turns to YELLOW (or the default color if changed).
- To delete the arrow marks, press the ***Clear*** key right after pressing the ***F2 (Arrow)*** key or after pressing the **Comment** key and the top **Trackball** key.

*NOTE: This action clears the comments only, not the arrows on the screen. To erase all comments as well as arrows, press and hold the **Clear** key.*

*NOTE: To prevent the Trackball from changing the arrow angle, select the "Keep arrow angles" preset at Utility -> Annotation -> Comments.*

## Text Overlays

There are 2 layers of the text in comments, which can be selected by toggling the ***F8 (Text1/Text2)*** key on the keyboard. Text1 is the default choice.

By using this function, users can perform a HIDE TEXT/SHOW TEXT, allowing the users to save or print an image without clearing the typed text.

You can specify to display text 1, text 2, or both. This allows you to have some comments that do not change during the exam while allowing you to change the other comment. Toggle the ***F8*** key to cycle through the three Text 1/Text 2 states:

1. Text 1 Only -- Only Text 1 displays.
2. Text 2 Only -- Only Text 2 displays.
3. Text 1 and Text 2 -- Both displayed; only Text 2 comments editable. Only Text 2 comments erased by Clear key. Word Delete only deletes Text 2 comment. Both Text 1 and Text 2 comments erased with new patient, new exam, or probe change.

To preset the Text Overlay Sequence, go to ***Utility -> Comment -> Comment*** and select either **Text 1 and Both** or **Text 1 and Text 2 and Both**.

The font color for the Text1 and Text2 overlays can be set separately. Go to ***Utility -> Comment -> Comment*** and specify the text color for Text 1 Color and Text 2 Color.

*NOTE: If you check “Erase when image is unfrozen” in the Utility menu, only the editable text plane erases when you unfreeze the image.*

## Annotating an image with typed words

- Press **Comment** and type the comments where the cursor is currently located (the display's home position) and use the **Trackball** to further place the comment cursor in the desired location.
- Press ***Enter*** to move to the next line.

*NOTE: Comments wrap to the next line when they are within one character of the right margin if Word Wrapping is selected in the Text Boundary preset. See 'Comments Libraries/Comments Preset Menu' on page 16-62 for more information.*

The word wrap starts one line below the start of that comment.

Comments appear on all prints, photos, DVR or CINE loops.

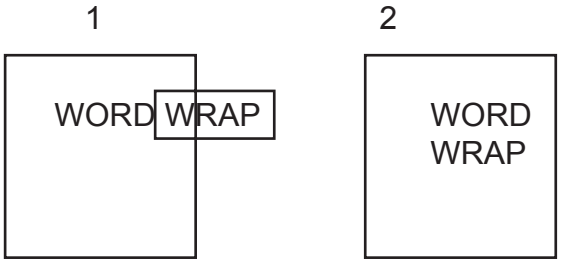



Figure 6-6. Next Line Word Wrap

1. Before
2. After

If the cursor appears at the right edge of the lowest line, or a word cannot be completed in the lower right corner, word wrap cannot be executed.

*NOTE: The same word wrap principles apply for library scripts as typed comments.*

## Annotating an image using the library

To reduce the amount of time spent annotating an image, store frequently-used comments in the Comment Library. As many as 6 libraries are available per study. One of the selected libraries is designated as the default and its entries shall be displayed on the touch panel when the comment mode is activated for that study.

Press **Comment** and move the comment cursor location using the **Trackball**.

Select the desired comment from the touch panel.

Each touch panel key can also be configured to hold a small list of up to 3 comments. The first word in the list is displayed on the touch panel and the others can be accessed by toggling the key or pop-up menu. To show the presence of a small list stored under a particular key, a small indicator (>) is placed on the key.

To program your system with specific comments, see ‘Comments Libraries Presets’ on *page 16-59* for more information.

### Moving Texts

You have the ability to move comments already on the screen and place them in different locations.

- Place the cursor on the desired text or text group and press ***Set***.
- The selected text color turns to green.
- Use the ***Trackball*** to move the selected text and press ***Set***.

### Editing while annotating

Backspace over any error(s) made. Blank spaces take the place of the letter(s) that were there. Continue typing the comment after backspacing over all incorrect letters.

To delete previous character(s):

- Press ***Backspace*** as many times as necessary to make the deletion.
- Once all texts within the selected text group are deleted, then the cursor will find another text group to delete to the upper left direction.
- If there is no more text to delete, the cursor will be located at home position.

To move through the text a word at a time:

- Press ***Tab*** to move to the right by text group (Preset Keyboard Tab = Word)

*NOTE: Press Shift + Tab to move to the left.*

To activate the last text group typed or selected from the Library:

- Press ***F9 (Grab Word)*** key. The selected comment will be highlighted.
- To increase/decrease the area of the highlighted selection use HIGHLIGHT rotary.

*NOTE: Once the text is highlighted, typing comments or choosing them from the library replaces the highlighted text.*

*NOTE: To select all text groups, Press Shift + F9 (Grab Word) key.*

To cancel the last action:

- Press **Undo** key.

## Body Patterns

An additional way to annotate the image display is with body patterns. Body patterns are a simple graphic of a portion of the anatomy that is frequently scanned. The body pattern and probe marker can serve as a reference for a patient and probe positioning when images are archived or scanned.

To activate body patterns, press the ***Body Pattern/Ellipse*** control. A maximum of 6 body pattern packages are displayed on the touch panel according to exam category and preset.

*NOTE: To activate a Body Pattern by nudging the **Body Pattern/Ellipse** control, check Bump Body Pattern control for easy entry via Utility--> Body Patterns --> Body Patterns.*

The body pattern packages may be customized to accommodate user preference. Up to 30 individual body patterns in the packages can be changed. See ‘Body Pattern Libraries/Applications Preset Menu’ on *page 16-71 for more information.*

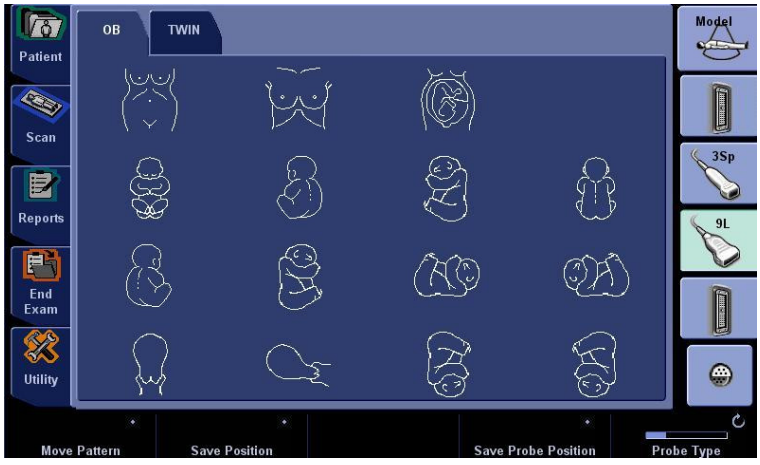



Figure 6-7. touch panel displays of Body Pattern - example

## Body Patterns (continued)

Select the desired body pattern on the touch panel. The selected body pattern is displayed on the monitor.

- Press the **Move Pattern** control on the touch panel to reposition the body pattern with the **Trackball** and **Set** controls.
- Move the body pattern to the desired location and press the **Save Position**.Current position of Body Pattern is saved as a Home Position of current display format. Hold down **Save Position** to reset the home position to factory default.

*NOTE: Home Position is independent between the display format.*

*NOTE: Body Pattern Position is updated when the display format is changed.*

*NOTE: Body Pattern Position is reset to factory default when patient is changed (i.e. End Current Patient, Register Patient).*

- A probe mark is associated with the body patterns and illustrates the probe position on the body pattern. This marker can be placed with the ***Trackball*** and rotated with the ***Ellipse*** control.
- The probe mark type is selectable by rotating the **Probe Type** control on the touch panel. There are different choices available with one being a blank selection.
- To select the active side in dual B-Mode, use the **Active Side** rotary control at the bottom of the touch panel.
- To clear the body pattern, press the ***Body Pattern/Ellipse*** control to activate body patterns and then press the ***Clear*** key.
- Press ***Set*** on the keyboard or **Scan** on the touch panel to exit without erasing the body pattern.

## Body Patterns (continued)

- Select the ***Save Probe Position control*** to save the probe mark position and angle for each body pattern.

1. Display the body pattern.
   - Move and rotate the probe mark as appropriate.
   - Select ***Save Probe Position***.
2. Hold down ***Save Probe Position*** to clear probe mark on the touch panel.

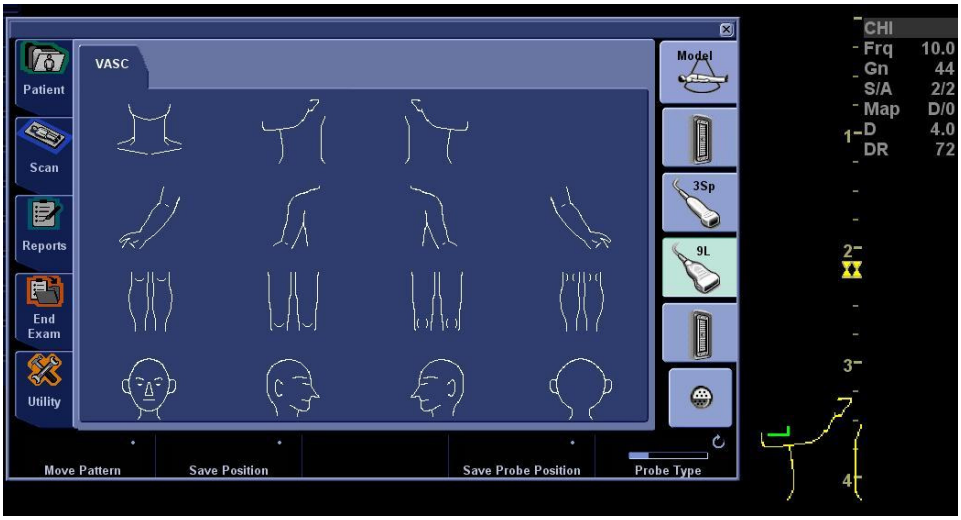



Figure 6-8. Save probe position

- You can use the **Zoom** control to select the body pattern. If you want to assign the select function to the Zoom control, see ‘Body Pattern Libraries/Libraries Preset Menu’ on *page 16-67*.

### Notes for Body pattern (Probe mark)

- Probe Type is the type of probe mark displayed on the body pattern. It can be saved only for each body pattern on the touch panel while body pattern is activated, but not in the Utility preset menu. Therefore, Probe Type cannot be saved as an Application or System Preset.

  To save the Probe Type,

  a. Activate the **Body Pattern**.
  b. Select a Body Pattern on the touch panel.
  c. Select a type of probe mark with the ***Probe Type*** touch panel key.
  d. Place the probe mark at the proper location.
  e. Select the ***Save Probe Position*** touch panel key.

*NOTE: "Save Probe Position" saves both the Probe Mark position and Probe Type.*

- When a Body Pattern is selected and no Probe Mark has been saved on it, the latest used Probe Mark is carried over to the Body Pattern.

**Notes for Body pattern (Probe mark) (continued)**

- Check the Body Pattern on the touch panel if the Probe Mark does not appear on the monitor.

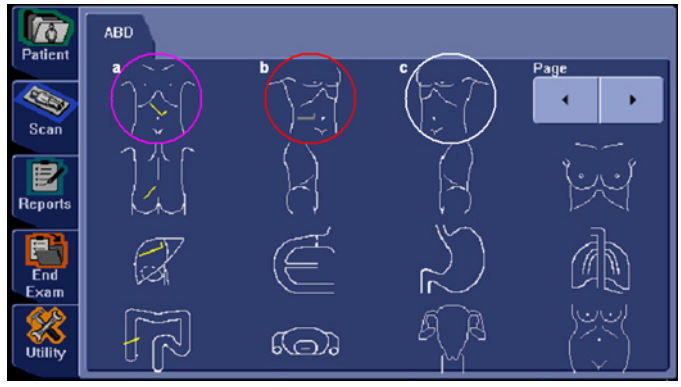



Figure 6-9. Body Pattern touch panel

a. When the Probe Mark is saved for the Body Pattern, the Probe Mark is displayed in yellow on the touch panel and should also be shown on the monitor.

b. When the Probe Mark is saved with “Probe Type - None”, the Probe Mark is displayed in gray on the touch panel and is not shown on the monitor. Reselect an appropriate Probe Type and save as necessary.

c. When the Probe Mark is not saved, no Probe Mark is displayed either on the touch panel or the monitor. Select an appropriate Probe Type and save as necessary.

## Body Patterns (continued)

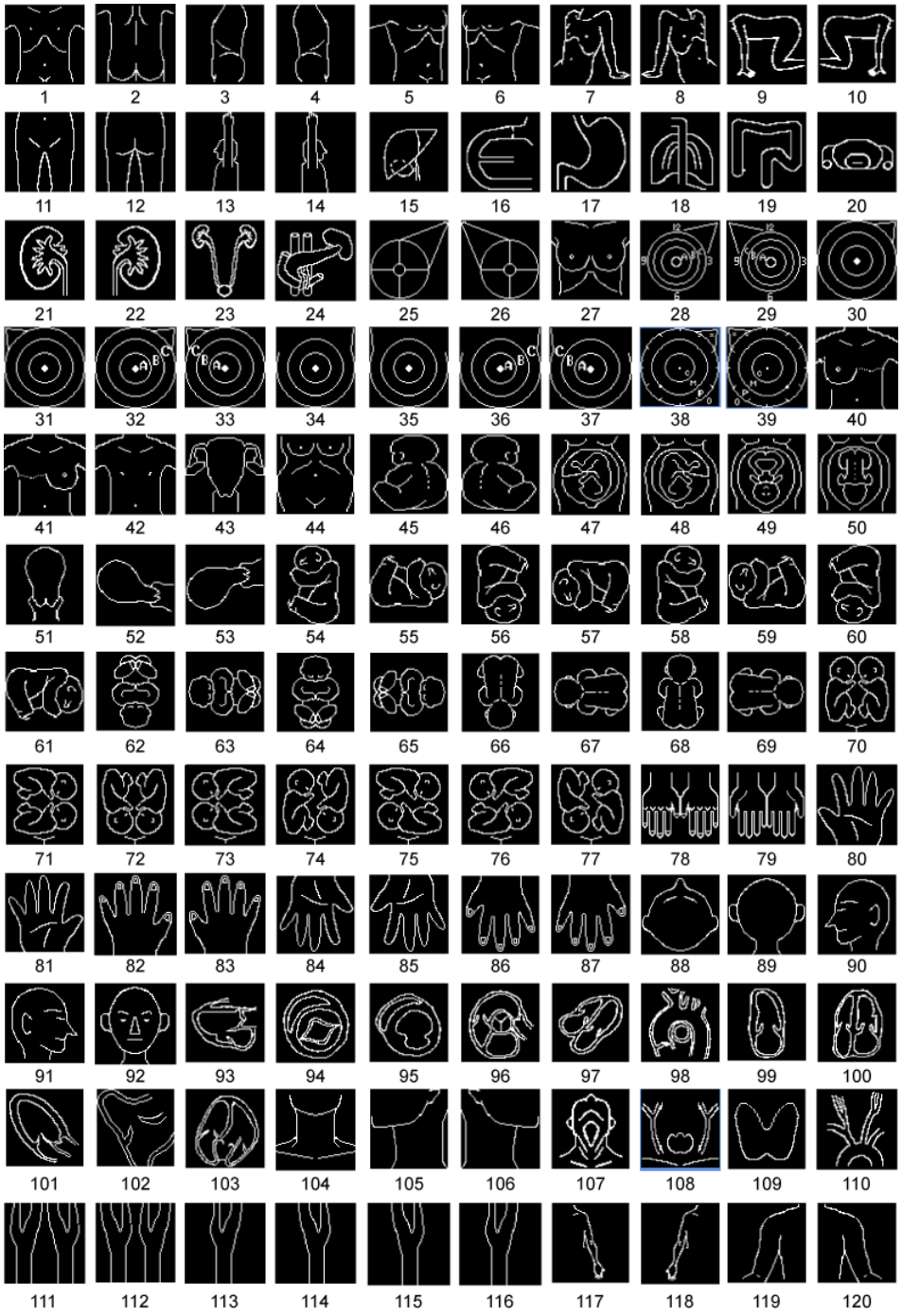



Figure 6-10. Body Patterns Available

## Body Patterns (continued)

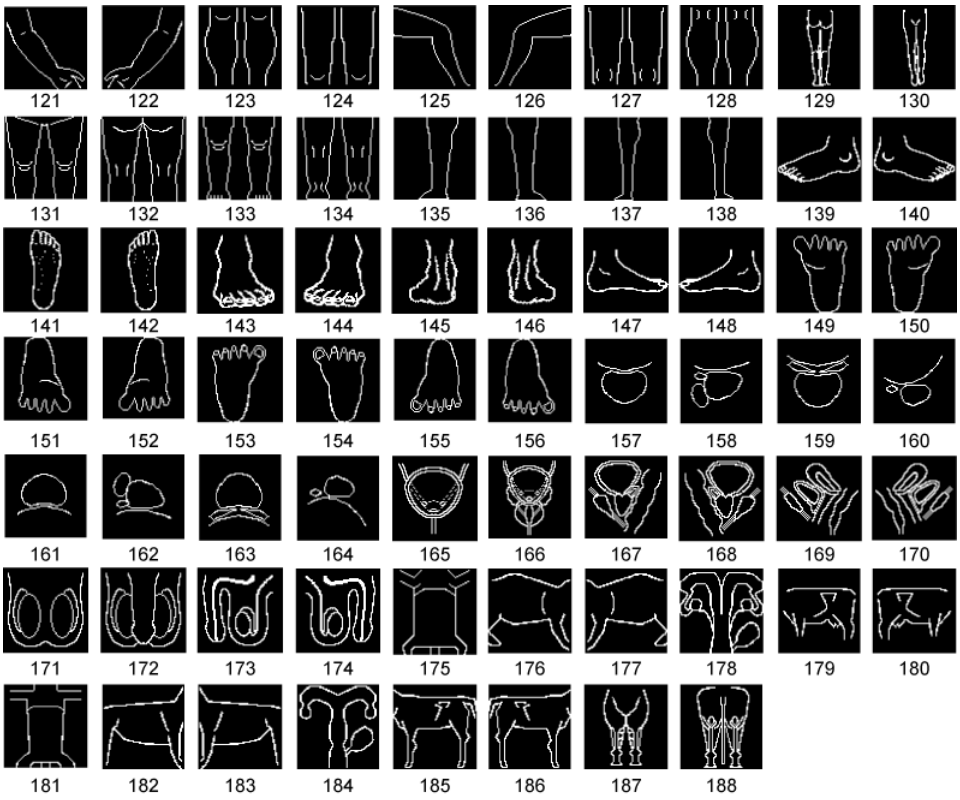



Figure 6-11. Body Patterns Available (continued)

## Body Patterns (continued)

1. body1
2. body2
3. body3
4. body4
5. body5
6. body6
7. body7-Lt
8. body7-Rt
9. body8-Lt
10. body8-Rt
11. body9
12. body10
13. body11-Lt
14. body11-Rt
15. liver
16. organ1
17. organ2
18. organ3
19. organ4
20. organ5
21. organ6
22. organ7
23. organ8
24. organ9
25. breast1
26. breast2
27. breast3
28. breast4-Lt
29. breast4-Rt
30. breast5-Lt
31. breast5-Rt
32. breast6-Lt
33. breast6-Rt
34. breast7-Lt
35. breast7-Rt
36. breast8-Lt
37. breast8-Rt
38. breast9-Lt
39. breast9-Rt
40. Post breast-Lt
41. Post breast-Rt
42. Post breast-bilateral
43. pelvis1
44. pelvis2
45. ob1
46. ob2
47. ob3
48. ob4
49. ob5
50. ob6
51. uterus1
52. uterus2
53. uterus3
54. fetus1
55. fetus2
56. fetus3
57. fetus4
58. fetus5
59. fetus6
60. fetus7
61. fetus8
62. fetus9
63. fetus10
64. fetus11
65. fetus12
66. fetus13
67. fetus14
68. fetus15
69. fetus16
70. twin1
71. twin2
72. twin3
73. twin4
74. twin5
75. twin6
76. twin7
77. twin8
78. hand1
79. hand2
80. hand3-Lt
81. hand3-Rt
82. hand4-Lt
83. hand4-Rt
84. hand5-Lt
85. hand5-Rt
86. hand6-Lt
87. hand6-Rt
88. head1
89. head2
90. head3
91. head4
92. head5
93. heart1
94. heart2
95. heart3
96. heart4
97. heart5
98. heart6
99. heart7
100. heart8
101. heart9
102. heart 10
103. heart 11
104. neck1
105. neck2
106. neck3
107. neck4
108. neck5
109. thyroid
110. carotid1
111. carotid2
112. New carotid2
113. carotid2-Lt
114. carotid2-Rt
115. Carotid3-Lt
116. Carotid3-Rt
117. arm1
118. arm2
119. arm3
120. arm4
121. arm5
122. arm6
123. leg1
124. leg2
125. leg3
126. leg4
127. leg5
128. leg6
129. leg7
130. leg8
131. leg 9
132. leg 10
133. leg 11
134. leg 12
135. legs13-a-Lt
136. legs13-a-Rt
137. legs13-Lt
138. legs13-Rt
139. foot1-Lt
140. foot1-Rt
141. foot2-Lt
142. foot2-Rt
143. foot3-Lt
144. foot3-Rt
145. foot4-Lt
146. foot4-Rt
147. foot5-Lt
148. foot5-Rt
149. foot6-Lt
150. foot6-Rt
151. foot7-Lt
152. foot7-Rt
153. foot8-Lt
154. foot8-Rt
155. foot9-Lt
156. foot9-Rt
157. uro1
158. uro2
159. uro3
160. uro4
161. uro5
162. uro6
163. uro7
164. uro8
165. uro9-female
166. uro9-male
167. uro10-female-Lt
168. uro10-female-Rt
169. uro10-male-Lt
170. uro10-male-Rt
171. uro11
172. uro12
173. uro13-Lt
174. uro13-Rt
175. vet-cat1
176. vet-cat2
177. vet-cat3
178. vet-cow1
179. vet-cow2
180. vet-cow3
181. vet-dog1
182. vet-dog2
183. vet-dog3
184. vet-horse1
185. vet-horse2
186. vet-horse3
187. vet-horse4
188. vet-horse5

# Using the Fast Key

## Overview

A keyboard Fast Key is available to record and run a sequence of often-run keystrokes.

*NOTE: Ensure that you have a patient selected prior to running the Fast Key operation.*

## Create a Fast Key

1. Press the ***F5*** key. The “Do you want to create the Fast Key?” dialog displays. Select OK to continue.
2. Select a key to assign a Fast Key to (a-z, 0-9).

   If you select a Front Panel control, a touch panel key or any key besides a-z or 0-9, a warning dialog displays and the procedure is cancelled.

*NOTE: Assign Fast Key Function to Key 0 - 9 in Utility -> System -> User Configurable Key before you create a Fast Key.*

*NOTE: There is no distinction between capital and small letters.*

*NOTE: The key code is the same in Russian and Greek (a-z, 0-9).*

## Create a Fast Key (continued)

3. If the selected key is already assigned to a Fast Key, a warning dialog displays.

   Select Yes to continue. The Fast Key file is overwritten.

   Select No to cancel the Fast Key setup.

4. Input the key sequence to be assigned.

*NOTE: It is impossible to save a power cycle sequence or any input from outside of the system.*

*NOTE: If a warning dialog displays due to the limitations of the number of key sequences, press F5 to finish and retry.*

5. Press the ***F5*** key to complete a Fast Key setup. The information dialog displays. Select OK.

## Start a Fast Key

1. Press the ***F6*** key to start a Fast Key. The message “Select the key which the Fast Key is assigned to” displays on the status bar.

*NOTE: The F6 key is ignored if another dialog displays on the system.*

*NOTE: If you press F5 after F6, the F6 function cancels and the F5 function is enabled.*

2. Press the key assigned to the Fast Key macro. The message “Fast Key playback is finished” displays on the status bar when the macro is finished.

   To stop the Fast Key during the operation, press ***F6***. The message “Fast Key playback is cancelled” displays on the status bar.

*NOTE: Select the running speed in the Run Fast Key Speed preset on Utility -> System -> General.*

## Backup and Restore the Fast Key

You can backup/restore the Fast Key via Utility -> System -> Backup/Restore.

To backup, select User Defined Configuration in the Backup section.

To restore, select User Defined Configuration in the Restore section.

# Scan Assistant

## Introduction

Scan Assistant provides an automated exam script that moves you through an exam step-by-step. This allows you to focus on performing the exam rather than on controlling the system and can help you to increase consistency while reducing keystrokes. The system automatically invokes the correct mode and imaging parameters, advances to the next step in an exam, annotates the image, initiates measurements, and assigns the measurements to the worksheet/report.

## Availability

The following additional imaging parameters and preferences are available for use in a Scan Assistant program: Contrast, Contrast Clock, CW Doppler, Dual on Freeze, Depth, Color Scale, PW Doppler Scale, PW Sample Volume size, and Flow Model Selection.

You can initiate one or more manual Doppler measurements/ calculations.

Body Patterns are available for use during a Scan Assistant program. You can turn a Body Pattern on/off, select a particular Body Pattern graphic, and specify the position of the probe mark on the Body Pattern graphic.

The footswitch can be used with Scan Assistant. You can map Pause/Resume, Previous Step, and Next Step to the footswitch.

The “Always Use Doppler Cursor” preset, available on the Utility --> System --> General page, allows all PW Doppler steps to start with full screen 2D image plus mode cursor. You can specify the Store Order in Scan Assistant to set the Reading Order for the radiologist. The Learn Probe attribute can be set to learn and change the probe for the user in the middle of the exam.

## Scan Assistant Definitions

Scan Assistant definitions:

- **Scan Assistant Manager**. Available via the Utility -> Scan Assistant page to import/export Programs created via the Scan Assistant Creator and to assign Programs to a user/exam category.
- **Import**. Used to load Programs created via the Scan Assistant Creator on to the LOGIQ S7 Expert/Pro, LOGIQ S8 and LOGIQ E9.
- **Export**. Used to move Programs from one LOGIQ S7 Expert/Pro system to another LOGIQ S7 Expert/Pro and LOGIQ S8.
- **Scan Assistant Creator**. Used to create Scan Assistant Programs.

## Scan Assistant Description

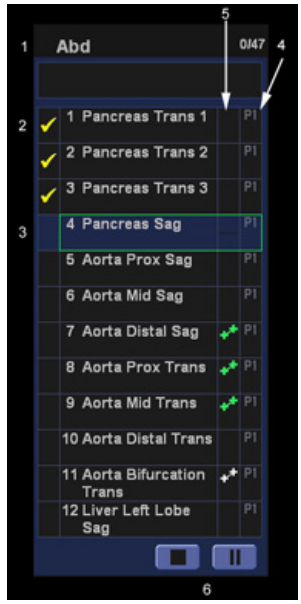



Figure 6-12. Scan Assistant Display Description

1. Program name, completed steps/out of total number of steps, and step description area.
2. Program step status (Complete/Incomplete), step number, step name. A checkmark indicates that this step has been completed. You can also manually check the box to bypass this step.
3. This column indicates the mode or when a measurement needs to be made.
4. This column indicates that the action moves the Program to the next step.
5. Active step The box is green when the program is active or yellow when it is paused.
6. Navigation: Stop, Pause, Pause/Resume. Edit (Pencil Icon). Also available via the left/right keyboard arrow keys. Stop also allows the program to be stopped, restarted, or a new program selected.

## Setting up Scan Assistant

To set up Scan Assistant,

1. Import the Scan Assistant Program created using the Scan Assistant Creator or exported from another LOGIQ S7 Expert/Pro program.
   a. Insert the media with the saved Program from the Scan Assistant Creator or exported program from another LOGIQ S7 Expert/Pro.

*NOTE:* *If you insert the media with exported program from another LOGIQ S8 and LOGIQ E9, the following dialog displays before Import Programs. Select Default for LOGIQ S8 or LOGIQ E9.*

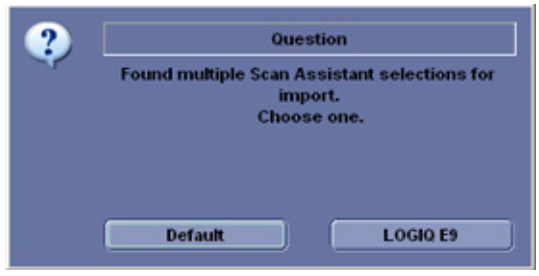



Figure 6-13. LOGIQ S8 and LOGIQ E9

*NOTE:* *If you insert the media with exported program from LOGIQ E9, the following dialog displays before Import Programs. Click OK.*

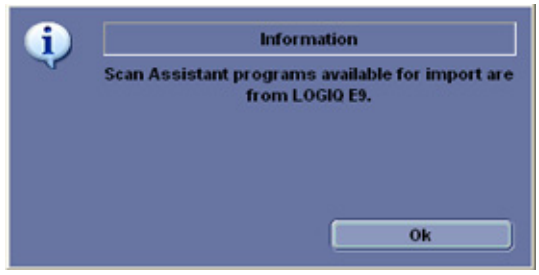



Figure 6-14. LOGIQ E9 only

## Setting up Scan Assistant (continued)

b. Press Utility -> Scan Assistant.

c. Select Import from the Scan Assistant Manager page.

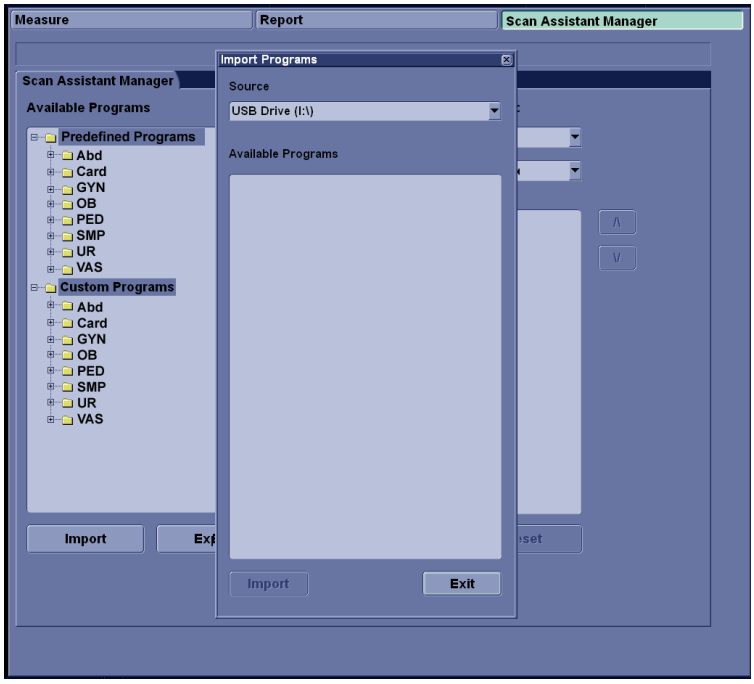



Figure 6-15. Import Programs

d. In the Source field at the top of the Import Programs pop-up, select the media that the Program is stored on.

## Setting up Scan Assistant (continued)

e. Highlight the Program(s) to be imported. If a folder is highlighted, all programs in the folder are selected.

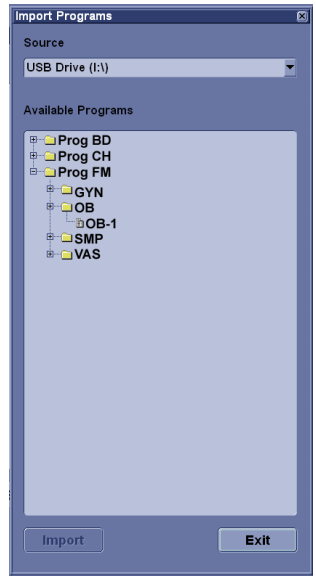



Figure 6-16. Import Programs

## Setting up Scan Assistant (continued)

f. Select Import. The Program(s) you selected are stored to the LOGIQ S7 Expert/Pro. You can add it to the exam category and user.

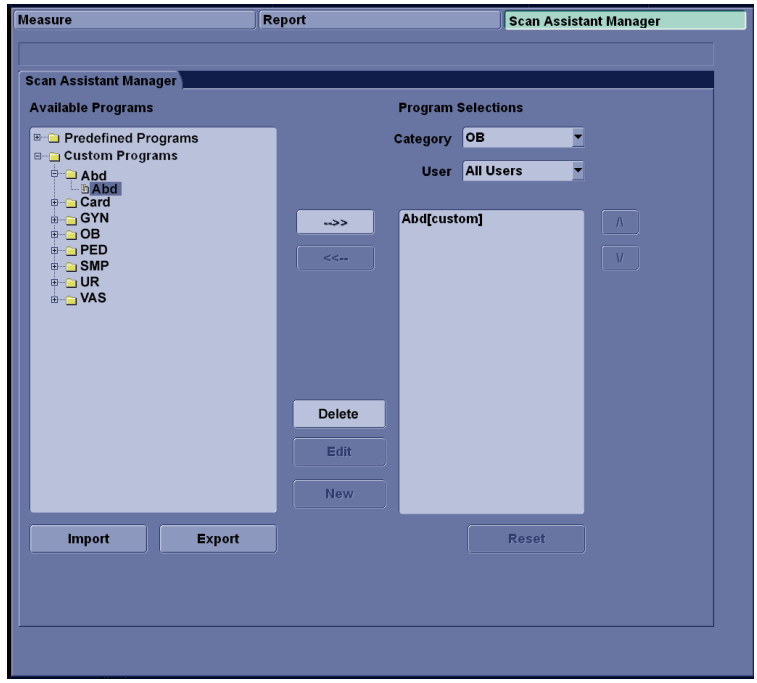



Figure 6-17. Add Program

## Setting up Scan Assistant (continued)

2. Assign the imported Program to the exam category and user. Under Program Selections on the right-hand side of the Scan Assistant Manager page, specify the Exam Category and User for this Program. You can select All Users, or a specific user. If you specify All Users, all users will have the ability to use this Program while in the specified exam category, unless the user has his/her own list defined.
3. Select the imported Program from Available Programs -> Custom Programs on the left-hand side of the page. Then press the right arrow button to move the imported Program to the exam category and user selected above.

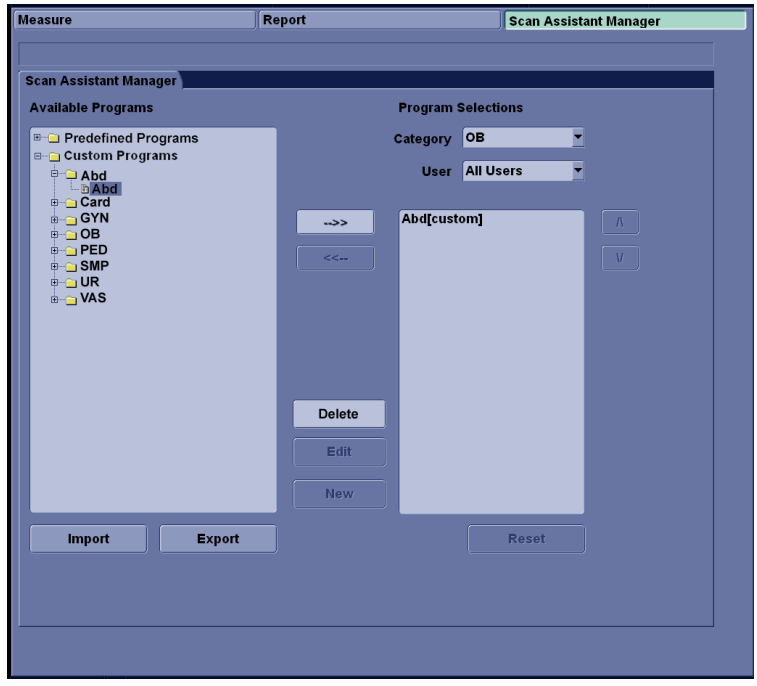



Figure 6-18. Add Program

## Setting up Scan Assistant (continued)

4. If you want the system to automatically select the last-used Program based on the Exam Description or Exam Category, you can preset the system to do so. Go to Utility -> System -> General -> Scan Assistant -> Auto Selection -> and select Description or Category.

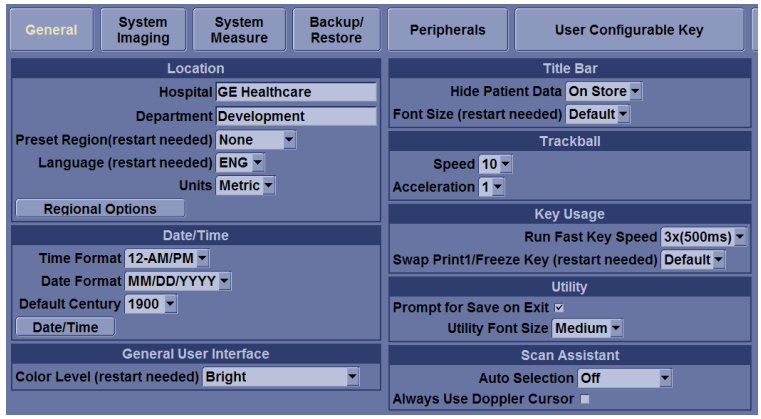



Figure 6-19. Scan Assistant Auto Selection

5. The Program list you created in Utility ->Scan Assistant is visible in the Program field on the Patient menu. Pressing New Patient erases any patient data and Scan Assistant program you entered. First press New Patient and then set up patient data,Scan Assistant program, and finally, press Register Patient.

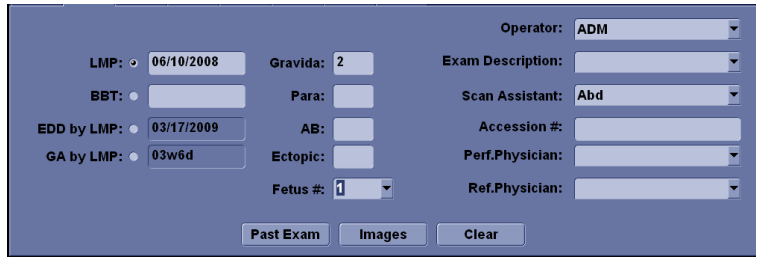



Figure 6-20. Patient Scan Assistant Program

## Setting up Scan Assistant (continued)

You can access the Scan Assistant Creator to edit the exam's program from the imaging display via the Creator Icon located at the bottom, left-hand corner of the Scan Assistant Program monitor on the display. You can activate the Scan Assistant Creator from the image screen, make edits, and then run Scan Assistant to test your changes.

*NOTE: If you edit the program after you have already stored several images, and your edits change the number of program steps, you are prompted to Restart or Continue the Scan Assistant program.*

*NOTE: If you edit the program after you have already completed several steps, checkmarked steps remain checkmarked, even if you insert a new step between checkmarked steps. If this is not correct, you can edit the checkmarks or restart the program.*

## Using Scan Assistant

After you have set up Scan Assistant, the Program is active when you exit the Patient menu. The Program is located on the left-hand side of the display and as you can see in the example below, the annotation for the first step has been automatically noted on the image, ready for you to scan the specified anatomy.

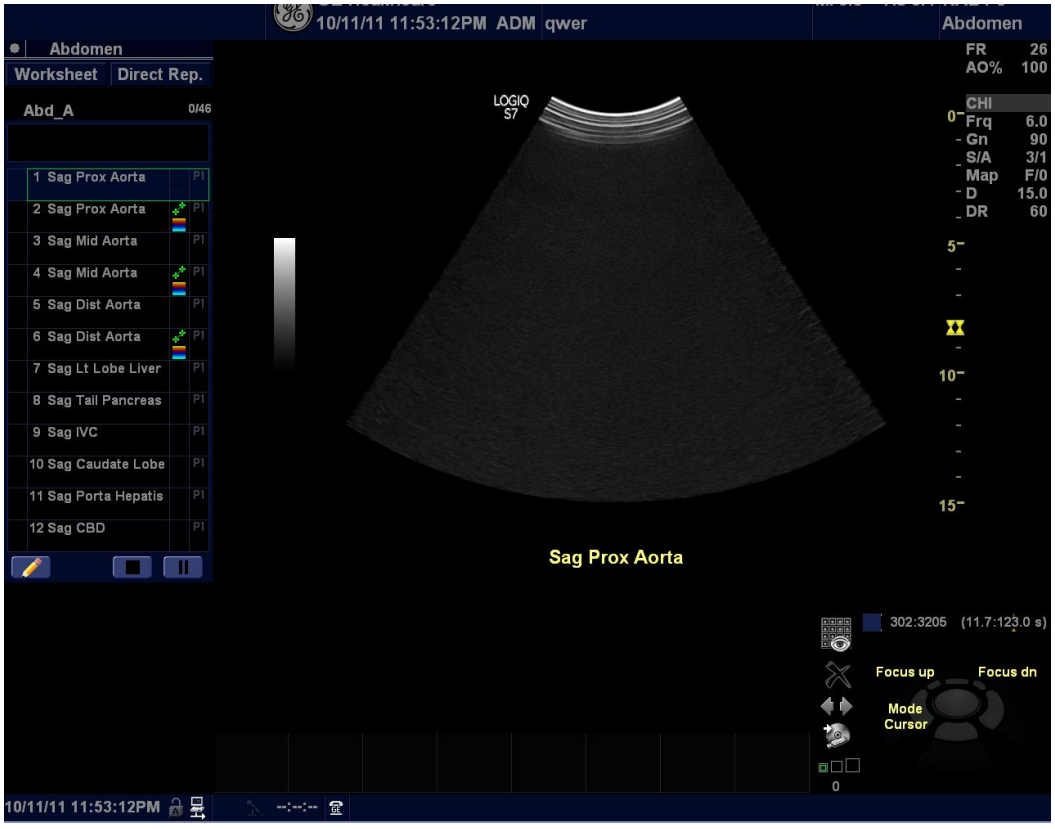



Figure 6-21. Scan Assistant Display

## Using Scan Assistant (continued)

1. Follow the steps indicated in the Program: image/measure the appropriate anatomy.
2. Perform the indicated trigger to move to the next step in the Program.

*NOTE: The footswitch can be used with Scan Assistant. You can map Pause/Resume, Previous Step, and Next Step to the footswitch.*

3. To pause or unpause Scan Assistant, press the pause button on the display or press the left/right arrow on the keyboard.
4. To stop or restart a Program, press the Stop icon at the bottom of the Scan Assistant Program. A dialog pops up. This dialog lets you restart the current Program, start another Program, or stop Scan Assistant.
5. To skip a step or move to a certain step, press the up/down arrows on the keyboard or select the step you want to move to using the Trackball and Set keys.

## Exporting Scan Assistant Programs

Exporting Scan Assistant Programs allows them to be imported to another LOGIQ S7 Expert/Pro or to be edited offline with the Scan Assistant Creator tool. To export a Program,

1. Insert the media to save the Program to.
2. Press Utility -> Scan Assistant.
3. Select Export from the Scan Assistant Manager page.
4. In the Source field at the top of the Export Programs pop-up, select the media that the Program is to be stored on.
5. Specify the Program Directory using the drop-down menu if the desired Program Directory already exists on the media. If not, or if you want to export the Program to a new Program Directory, type a new Program Directory name in the field.
6. Highlight the Program(s) to be exported. If a folder is highlighted, all programs in the folder are selected.

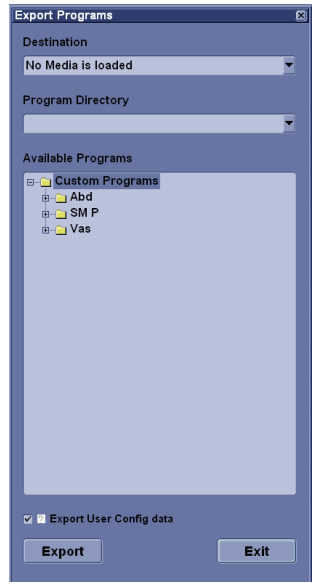



Figure 6-22. Export Programs

7. Select Export. The Program(s) you selected are stored to the media. You can now import it to a new LOGIQ S7 Expert/Pro.

# Using InSite ExC

## InSite ExC

InSite ExC is your direct link with a GE Online Service Engineer or Applications Support Engineer or a Request for Service via the InSite ExC link at the bottom of the display screen.

Figure 6-23. InSite ExC Icon

## Types of InSite ExC Service

1. **Request For Service**. Opens a service dispatch with GE Service.
2. **Connect to GE**. Direct contact with GE Technical Support.
3. **Connect Clinical Lifeline**. Direct contact with GE Applications Support.

## Initiating a Request for Service (RFS)

To initiate an RFS,

1. Position the Windows pointer on top of the GE InSite ExC icon at the bottom of the display.
2. Press the Right Trackball Set Key. This opens of the RFS screen which sends a service dispatch directly to GE Service after you fill in the following information:
   - Items with a red asterisk
   - Problem type
   - Problem area
   - Problem description
   - Send
3. After you have completed filling in all of this information, press ***Send*** to initiate the Request for Service.

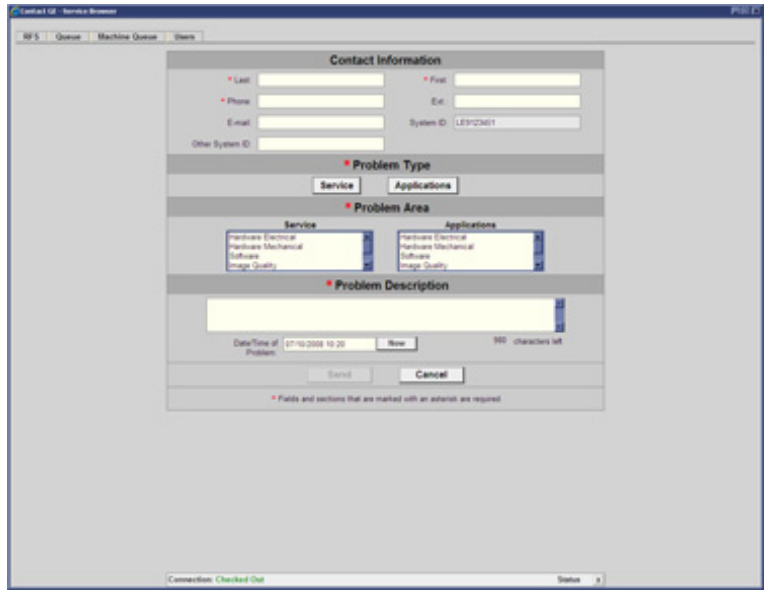



Figure 6-24. Request for Service Contact Information

## Initiating a Request for Service (RFS) (continued)

After you press Send, the following pop-up appears:

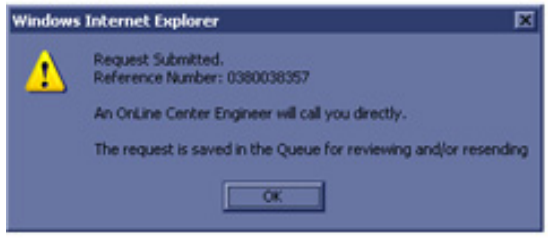



Figure 6-25. Request for Service Confirmation

All requests for service are listed on the Queue for your review.

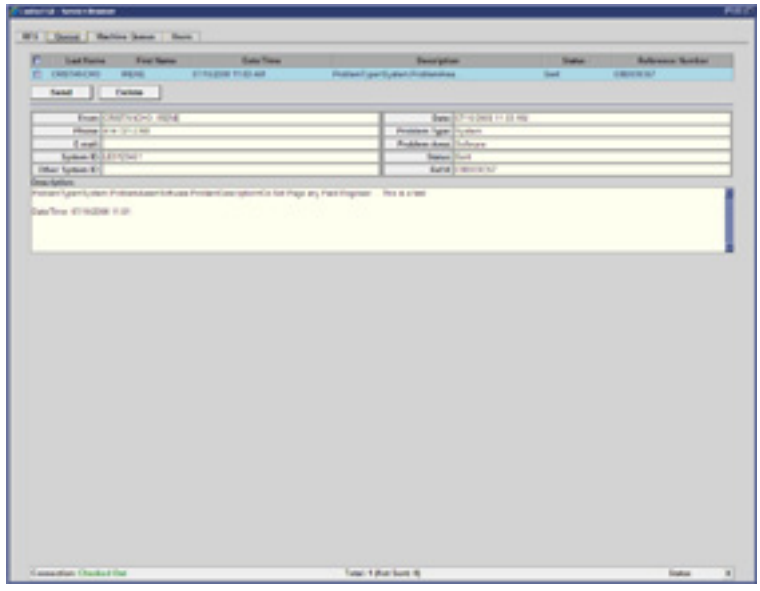


Figure 6-26. Request for Service Queue

## Initiating a Request for Service (RFS) (continued)

You can monitor your RFS as well as RFS's automatically sent by the system. The LOGIQ S7 Expert/Pro can automatically submit a Request for Service. These are displayed on the Machine Queue.

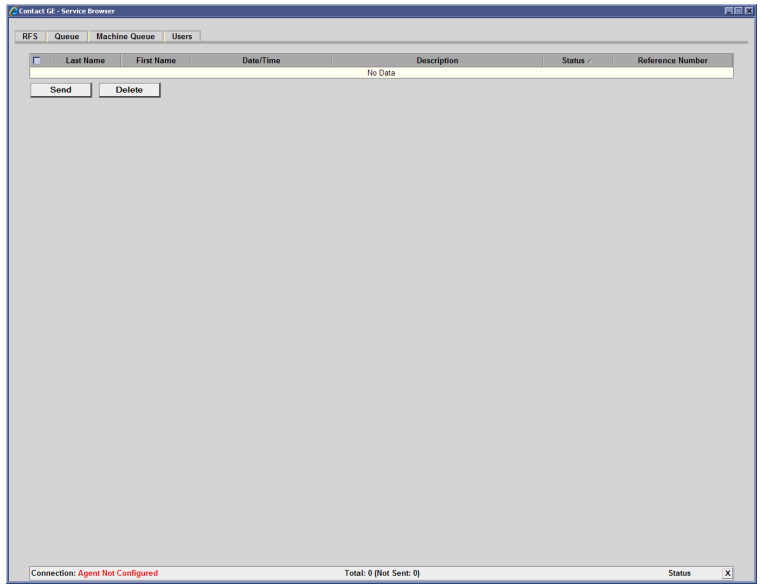



Figure 6-27. Machine Queue

## Initiating a Request for Service (RFS) (continued)

In addition, you can use the Users screen to identify your institution's point of contact for service displatches.

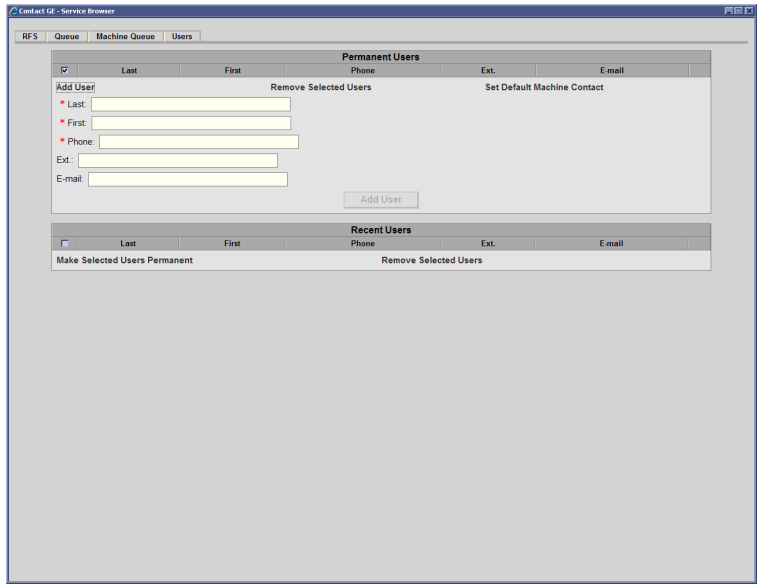



Figure 6-28. Users

## Initiating a Technical or Clinical Support Request

To initiate Technical or Clinical Support,

1. Position the Windows pointer on top of the GE InSite ExC icon at the bottom of the display.
2. Press the Left Trackball Set Key. This opens the following pop-up:
   - Connect to GE,
   - Connect Clinical Lifeline, or
   - Cancel

*NOTE: When you have contacted Applications or the Online Center/Field Engineer (OLC/FE), you may be asked to click on "Connect to GE": to increase the polling rate so that the OLC/FE can connect more quickly. Or, you may be asked to "Connect to Clinical Lifeline" so applications can connect to the system.*

3. Select Connect to GE for Technical Support; select Connect Clinical Lifeline for Clinical Applications Support; or press Cancel to exit.
4. If you've requested GE Service to perform remote service on the LOGIQ S7 Expert/Pro, answer Yes to the Insite Notification pop-up.

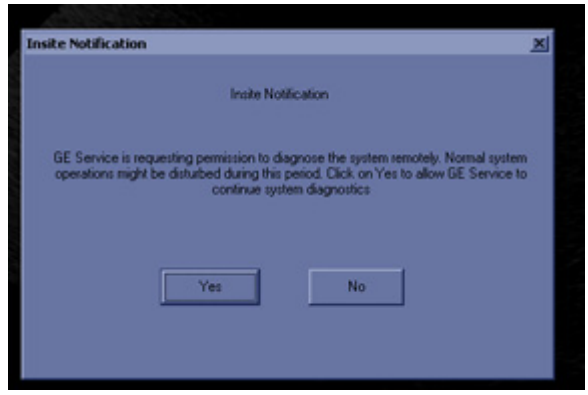



Figure 6-29. InSite Notification

*NOTE: In addition to contacting a technical/clinical support person, selecting this also changes the polling time from 15 minutes to 15 seconds so that your call can be answered as quickly as possible, as well as allowing disruptive mode.*

## Initiating a Technical or Clinical Support Request (continued)

InSite ExC icons appear differently, depending on their state:

Table 6-2: InSite ExC Icons

| Online Center | Non Disruptive | Disruptive |
|---|---|---|
| Not Connected | Black and White Icon - InSite ExC activated but system not open for Technical Support access. | Red Icon with Clock - InSite ExC activated and open for Technical Support, but currently not active. |
| Connected | Yellow Icon - InSite ExC activated and Technical Support can look around on your system, but cannot perform any service-related functions. | Red Icon with GE Logo - InSite ExC activated and Technical Support can look around on your system, run diagnostics, gather logs, and initiate VCO. |

## InSite ExC Definitions

Here are definitions for the different InSite ExC states:

**Virtual Console Observation (VCO)**. Allows Technical Support to control LOGIQ S7 Expert/Pro functionality remotely.

**Disruptive**. Allows GE's Technical Support person to connect to your system via VCO, to run diagnostics directly on your LOGIQ S7 Expert/Pro system, and to collect system logs. When the system is in Disruptive Mode, the icons are red. There are two disruptive states. If you see a telephone with a clock, then the system is in Disruptive, Not Connected Mode. If you see a telephone with GE, then the system is in Disruptive, Connected Mode.

**Non-Disruptive**. Allows GE's Technical support person to look around on your system, but cannot perform any service-related functions, depending on whether InSite has connected or not connected. There are two Non-Disruptive states. If you see a black and white icon, InSite ExC is activated, but not open for Technical Support access. If you see a yellow icon, InSite ExC is activated and the Technical Support person can look around on your system, but cannot perform any service-related functions.

**Connected**. InSite ExC is connected.

**Not Connected**. InSite ExC is not connected.

*NOTE: When Disruptive mode has been activated or a diagnostic has been run, the message, "Due to Service testing reboot required," appears in red at the bottom of the display. It is recommended that you reboot the system before use. Make sure you disable disruptive mode before rebooting or the message will not be cleared.*

## Exiting InSite ExC

To exit InSite ExC,

1. Press the Left Trackball Set key.
2. Select Connect Clinical Lifeline.
3. Press the Right Trackball Set key. The GE Technical Support person then exits Disruptive Mode and VCO.
4. Reboot your LOGIQ S7 Expert/Pro system.

# Electronic Documentation

## Documentation Distribution

Documentation is being provided via:

- Hardcopy
  - Release Notes (Optional)
  - AIUM Acoustic Output Booklet (USA Only, hardcopy)
- Electronic media. You can view user documentation (all languages) on a PC or on the Ultrasound Scanner via the Customer Documentation media, which includes:
  - Basic User Manual (translated)
  - Advanced Reference Manual (English only)
  - User Guide (translated)
  - Release Notes and Workarounds (translated, optional)
  - Basic Service Manual (English only)

## Using Online Help Via F1

Online Help is available via the F1 key. After pressing F1, Help appears. The Help screen is divided into three sections: navigational tools on the top, left portion of the screen (Hide, Back, Forward), help book navigational tools on the left portion of the screen (Contents, Index, Search, Favorites), and the content portion on the right side of the screen where help topics are displayed.

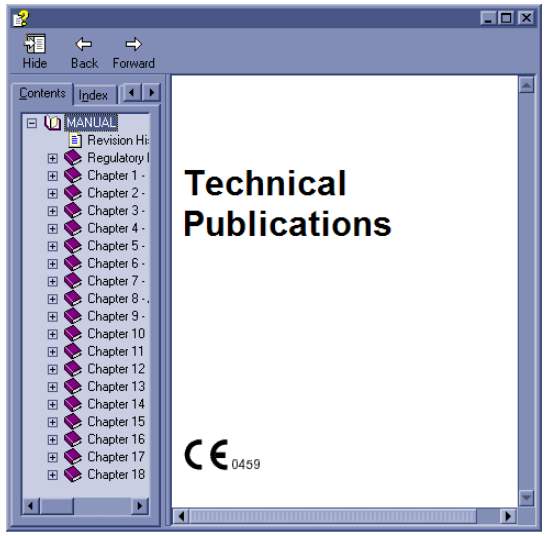



Figure 6-30. Opening Help Screen

## Navigating through the Help Book

Online Help is organized like a manual, with individual chapters, sections, and pages. Click on the plus (+) sign next to MANUAL to open up the book. Click on the plus sign next to the chapter you want to view to open up that chapter. Click on the plus sign next to the chapter you want to view to open up that section. Open up the page to view that page's information.

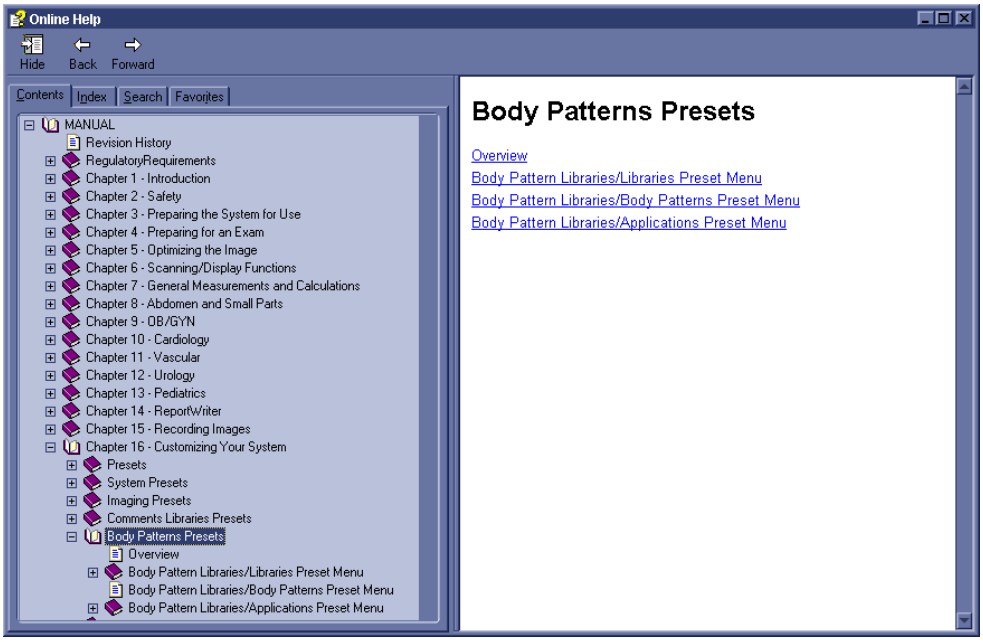



Figure 6-31. Sample Help Topic

The blue, underlined text links you to related topics. Click on the link to move to the new topic.

## Links

After you click on a blue, underlined portion of text, the screen updates with this link's content. To go back to the previous screen, press Back. To return to the link, press Forward.

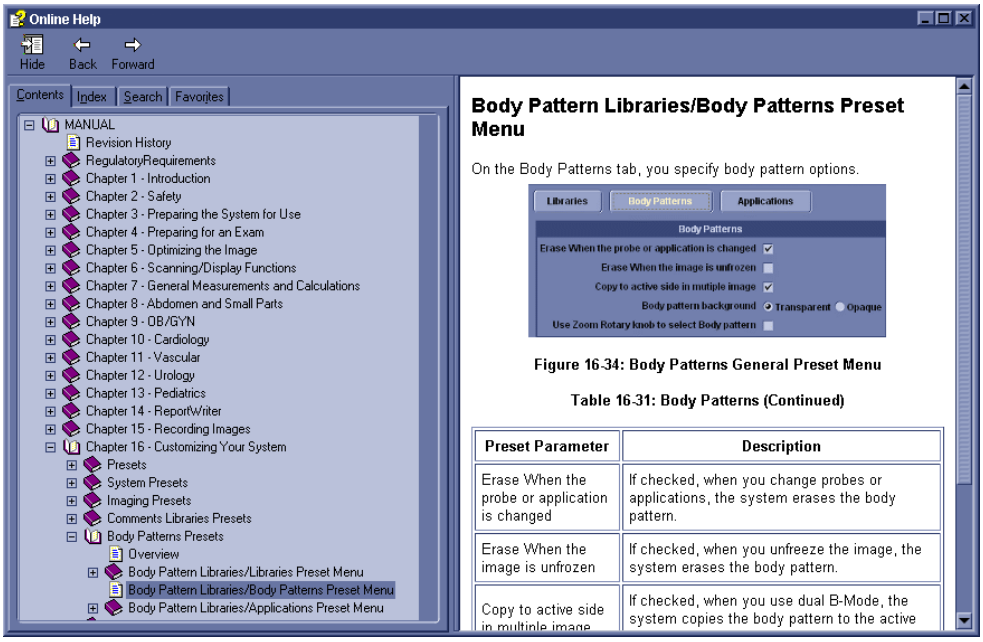



Figure 6-32. Topic Link

## Searching for a Topic

To search for a specific topic, click on the Search tab in the left portion of the screen. Type in the topic name in the *Type in the keyword to find:* field. Topics with the word or phrase you typed appear in the *Select Topic to display: area*. Either double click on the topic you want to view or highlight the topic and press the Display button to view this topics.

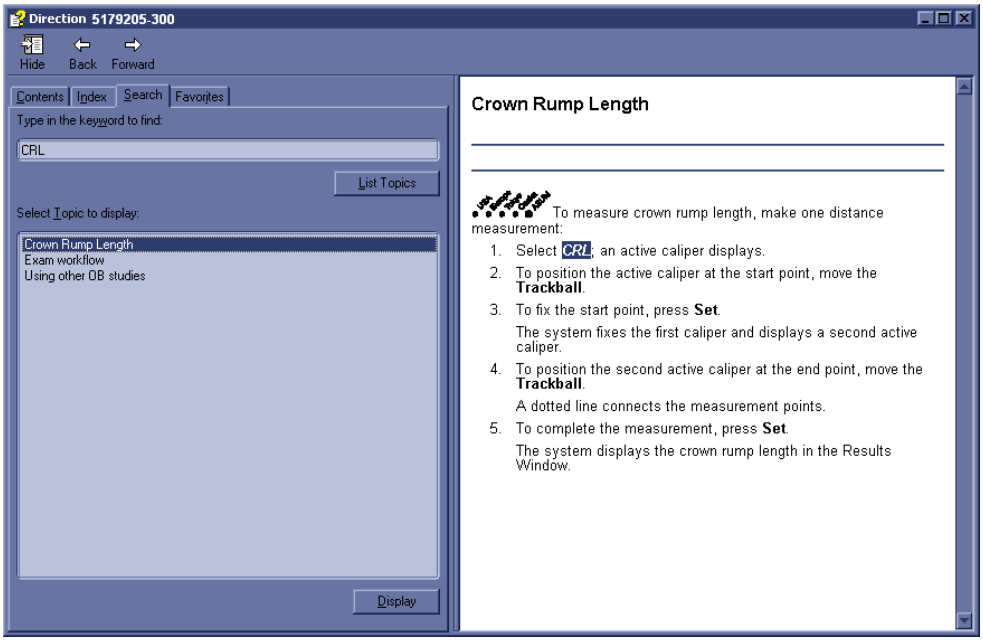



Figure 6-33. Search Results

## Saving Favorite Topics

You may find that there are topics you need to refer to often. In this case, it's a good idea to save these topics as Favorites. To save a topic as a favorite, press the Favorites tab, highlight the topic in the Topics window, and press the Add button. You can view this topic quickly by going to the Favorites help tab.

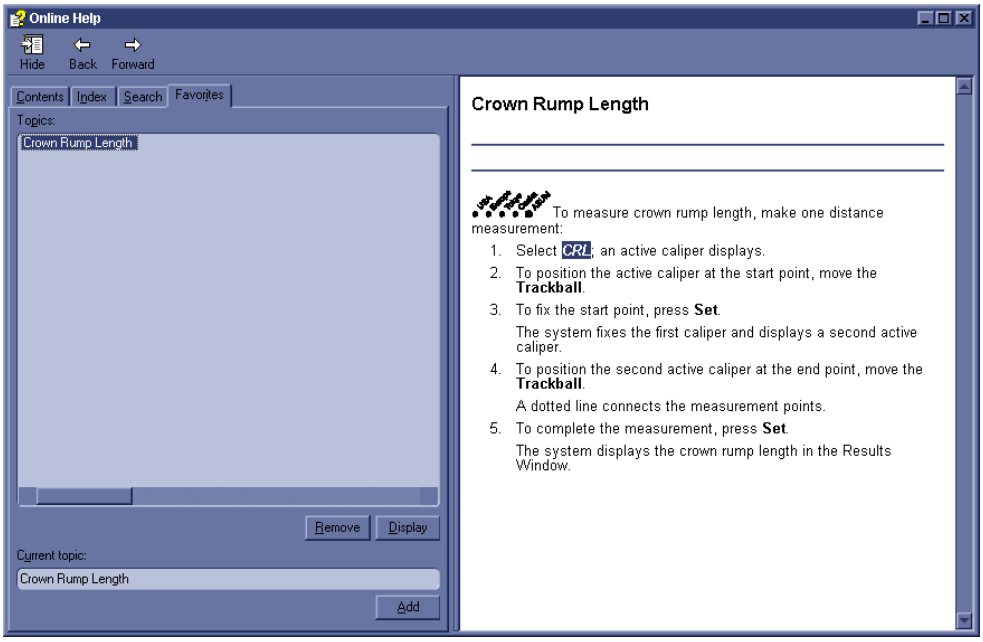



Figure 6-34. Adding Favorites

## Using the Index

Or, you can look for topics by using the Index. Press the Index tab, then use the scroll bar to look up a topic.

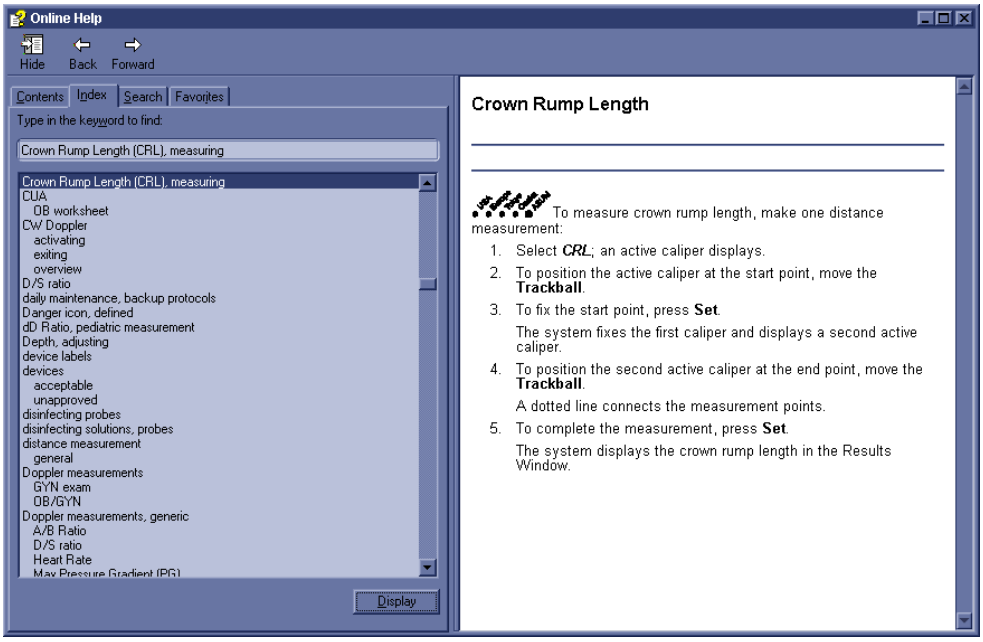



Figure 6-35. Index

## Other Help Features

To hide the left side of the screen, press the Hide icon at the upper, left-hand portion of the screen. To view the left side of the screen again, press the Show icon at the upper, left-hand portion of the screen.

To size the Help window, position and hold down the cursor at the corner of the screen while moving the Trackball.

To move the Help window to the touch panel display, position and hold down the cursor at the very top of the Help window while moving the Trackball to the touch panel display.

## Exiting Online Help

To exit Online Help, press the ‘X’ in the upper, right-hand corner of the Online Help window.

## Electronic media

### Accessing Documentation Via a PC

To view user documentation on a PC,

1. Insert the media into the media drive.
2. Open the media drive on your desktop.
3. Double click on the ‘gedocumentation.html’ document.
4. Select the item you want to view (click on the blue, underlined link in the File Name column).

To close the window, click on the ‘X’ in the upper, right-hand corner of the browser window.

*NOTE: If your PC does not have Adobe Reader, a free download is available on the Adobe website at http://www.adobe.com.*

## Accessing Documentation on the Ultrasound Scanner Via the media

To access documentation via the media,

1. Select Utility. Select Service. Wait until the logon screen appears.
2. Logon as ‘Operator’ next to Select User Level. Enter the following password: ‘uls’. Press Okay.

Figure 6-36. Operator Service Browser Login

## Accessing Documentation on the Ultrasound Scanner Via the media (continued)

3. Press Utilities.

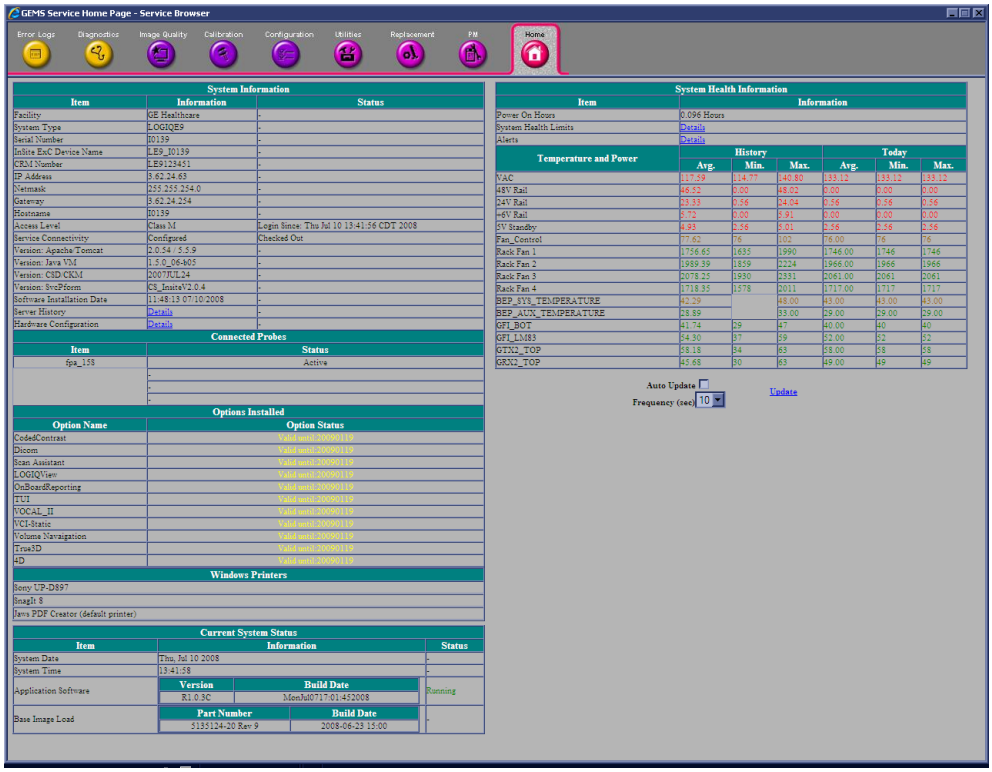



Figure 6-37. Service Browser Home Page

4. Insert the media.

## Accessing Documentation on the Ultrasound Scanner Via the media (continued)

5. Select Common Utilities.
6. Select Scanner Documentation Interface.

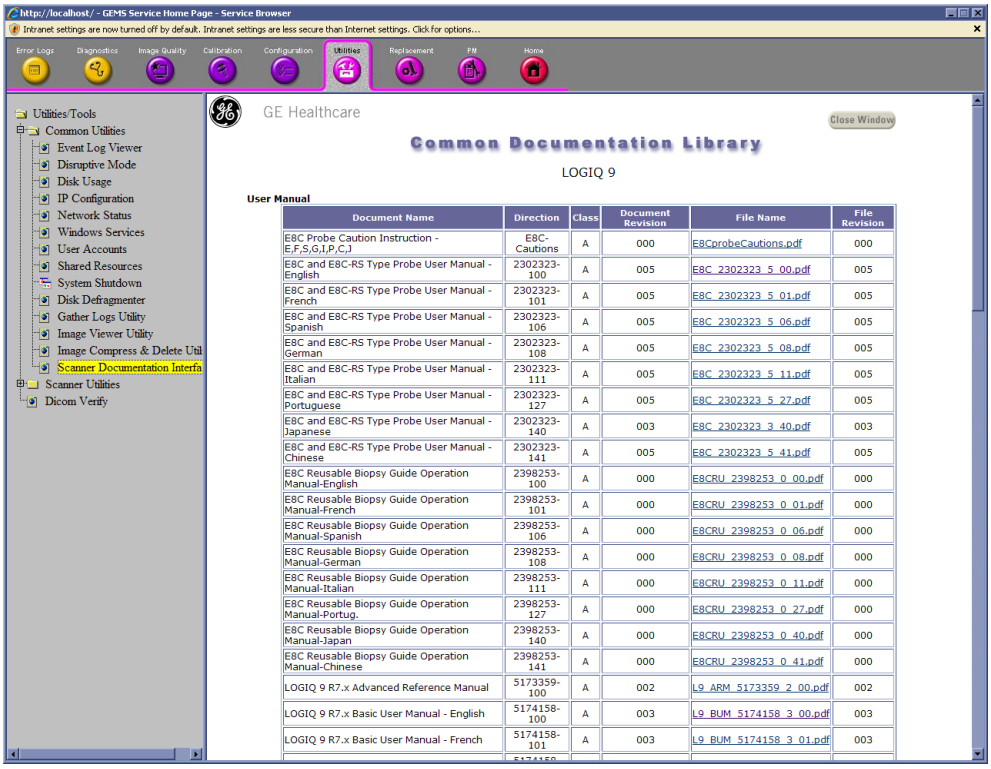



Figure 6-38. Scanner Utility Page

7. Scroll to find the document and double click on it to open it.

*NOTE: You can search through a document, use hyperlinks in the Table of Contents and Index to locate topics, and navigate via bookmarks.*

*NOTE: In addition to viewing documentation on the Ultrasound system, the Documentation media can be read on any PC.*

To exit, press the 'X' in the upper, right-hand corner of the documentation window.

# *Chapter 7*

# General Measurements and Calculations

*Describes how to perform general measurements and calculations.*

# Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by system accuracy, but also by the use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

## Overview

This section provides information about taking measurements and describes calculations available in each mode. It includes the following topics:

- Exam workflow
- Location of measurement controls
- Description of calipers
- List of generic measurements
- General information about taking measurements
- Mode Measurements: Step-by-step instructions for taking specific measurements, organized by mode
- Basic steps to view and edit worksheets

## Exam workflow

For each patient, the system organizes information by exam category, study, and measurement. The definitions of these terms are as follows:

- **Exam Category** – categories include the following:
  - Abdomen
  - Obstetrics
  - Gynecology
  - Cardiology
  - Vascular
  - Urology
  - Small Parts
  - Pediatrics
- **Study/Preset** – after you choose an exam category, the system allows you to select a study. For example, when you choose the Obstetrics exam category, you can choose one of the following studies:
  - Generic
  - OB-1
  - OB-2/3
  - OB-General
  - Fetal Heart
  - OB/GYN Vessel
- **Measurement** – the measurements and calculations needed to analyze an item of anatomy. For example, a femur length is a measurement. A measurement can include several pieces of measurement data. For example, to calculate the area of a gestational sac, you need to measure width, length, and depth.

For details on how to start a new patient, see ‘Beginning a New Patient’ on *page 4-3* for more information.

## Location of Measurement Controls

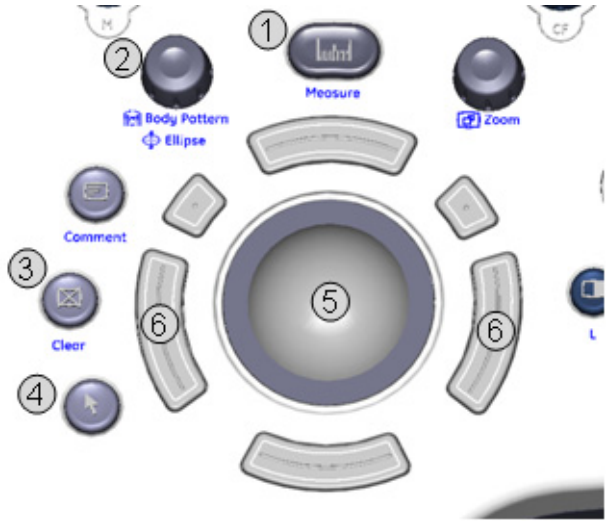



Figure 7-1. Locating Measurement Controls

1. **Measure**. Activates a measurement caliper and the calculation package associated with the currently selected preset.
2. **Ellipse**. After the first caliper for a distance measurement has been set and the second caliper positioned, **Ellipse** activates the area/ellipse measurement function. During the ellipse adjustment, turn the **Ellipse/ Body Pattern** control to increase the size of the curvevd lines. Select ***Cursor Select*** to adjust the measurement calipers.
3. **Clear**. During a measurement sequence, erases the measuring caliper and measurement data from the display. When not performing a measurement sequence, clears all calipers and measurements from the display.
4. **Pointer Key**. Select to display a pointer on the monitor.
5. **Trackball**. Moves the measurement calipers, selects the measurement on the Summary Window. Trackball also selects items on the touch panel with the Pointer and Set keys.
6. **Trackball Keys.** The functionality of these keys changes (e.g. Set, Change Measure, etc) depending on the mode or action. Current functionality is displayed on the lower-right corner of the monitor.

## Description of calipers

While you are making a measurement, the measurement caliper is either active (open plus sign) or fixed (closed plus sign). An active caliper is green and a fixed caliper is yellow.

The system allows you to identify measurements by number or by unique symbol. If you choose Number as the Cursor Type, after you complete a measurement, it is assigned a number. If you choose Symbol as the Cursor Type, after you complete a measurement, the caliper symbol changes to one of the nine shown below. The symbols are used in sequence as listed. The first symbol is used for the first measurement, the second symbol for the second measurement, and so on. The numbers or symbols also identify measurements in the Results Window.

Figure 7-2. Fixed Caliper Symbols

For information about how to choose Cursor Type of Number or Symbol, see ‘System/System Measure Preset Menu’ on *page 16-24*‘ for more information.

## Measurement line display

While you are making a measurement, the system displays a dotted line to show the measurement. After you press **Set** to complete the measurement, the dotted line remains on the display if the Show Caliper Line in the Options tab is selected. If Show Caliper Line is not selected, the system erases the dotted line and only the measurement calipers with a number or symbol are displayed. The Show Caliper Line on the Options tab takes precedence over the Cursor Line Display preset, found on the System -> System Measure screen.

## List of general measurements

The following types of general measurements are available when you press **Measure** but do not choose a specific calculation. The type of measurement depends on the current scan mode.

After pressing Measure, rotate between various measurement types with the Trackball keys.

**B and CF Modes**

- Dist (Caliper)
- Trace
- Spline
- Intensity
- Open Trace
- Open Spline

*NOTE: You can preset the sequence of B and CF area measurements in the Measure Key Sequence (B/CF) preset in the Utility -> Measure -> Advanced screen. See the "M&A Advanced Preset" section for more information.*

**Doppler Mode**

- Velocity
- Trace
- Slope
- Time

**M-Mode**

- Caliper
- Time
- Slope

## General Instructions

You can take measurements in all modes and image formats, including real-time, frozen, CINE, or DVR playback. After you select an exam category, the available calculations are displayed on the touch panel.

### Measurement and calculation results

As you take measurements, each measurement is given a sequential number on the display and in the Results Window. The system can display nine measurements on the screen at one time.

While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

Once the Results Window has nine measurements, if you make any further measurements, the system erases the first measurement and adds the new measurement ("first in, first out").

Measurement graphics are kept while in cine scroll. The measurement graphic is redisplayed on the frame where it is taken, if preset on the Advanced M&A page.

### Selecting a calculation

When you take measurements, you can select the calculation before you take the measurement or after you take it. For example, in Obstetrics, if you select the calculation before you take the measurement, the estimated fetal age is displayed as you take the measurement. If you select the calculation after you take the measurement, the estimated fetal age is displayed after you complete the measurement.

*NOTE: After you take a measurement, if you select a calculation and the measurement is not applicable for the calculation, then the system assumes you want to start the calculation. The system then uses the calculation for the next measurement.*

### Selecting a calculation (continued)

If there is a measurement listed in the Results Window that has not been assigned a calculation, to assign the measurement:

1. Press **Measure**.
2. To select the measurement in the Results Window, move the **Trackball** to the measurement.

   The measurement is highlighted.
3. Press **Set**.

   The system displays a list of applicable calculations. For example, if it is a distance measurement, the list includes all distance calculations for the current study.
4. To select an item in the list, move the **Trackball** to highlight the item and press **Set**.

   The system assigns the calculation to the measurement.

### Selecting a measurement in a different application

While scanning a patient, you may find that you want to measure an item that is not in the current application. To select a calculation from a different application:

1. Press **Measure**.
2. On the touch panel, select ***Exam Calcs***.
3. On the touch panel, select the ***Exam Category***.

   The system lists the exam categories.
4. Select the exam category that has the calculation you want to make.

   The system displays the touch panel for the selected exam category.
5. Select the study and the desired measurement.
6. After you complete the measurement, to return to the original application, repeat steps 1–4.

*NOTE: This measurement **DOES NOT** appear on the original application worksheet.*

## Specifying measurement and display options

The Options tab allows you to specify the following measurement and display options:

- Whether to display the Results Window and Summary Window
- The cursor size
- The number of heart rate cycles to use to calculate heart rate
- Where to position the Results Window on the monitor display
- Choose whether the Doppler waveform is automatically or manually traced.
- Choose to display the caliper line

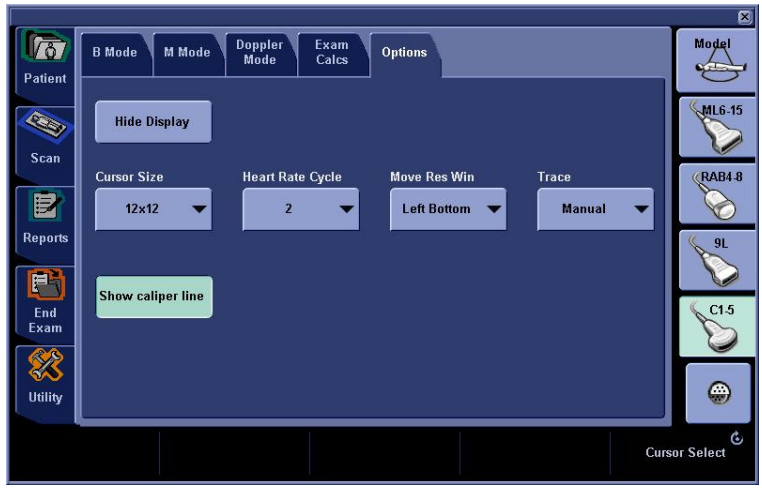



Figure 7-3. Measurement and Display Options

## Specifying measurement and display options (continued)

### Displaying the Results and Summary Windows

Typically, the Results Window and Summary Window are shown on the monitor display. If desired, you can remove them from the display. To remove them, select the ***Options*** tab, and then select ***Hide Display***. The activation indicator on the touch panel key is lit. To re-display them, select ***Hide Display*** again.

*NOTE: Hide Display removes both the Results Window and Summary Window from the monitor display.*

### Selecting cursor size

To select the cursor size, select the ***Options*** tab, and then select ***Cursor Size***. The system displays the following choices:

- 12 x 12
- 9 x 9

Select the size you want.

### Specifying heart rate cycles

When you measure heart rate, the system assumes a specific number of cycles are measured. You can change the number of cycles used in the calculation. To specify the number of heart rate cycles, select the ***Options*** tab, then select ***Heart Rate Cycle***. The system displays a list of choices from 1 – 10. Select the number you want.

After you choose a number, the next time you measure heart rate, the system assumes you are measuring the specified number of cycles. That number is used when calculating the heart rate.

After changing patients, the system defaults to the number specified in the Heart Rate Cycle parameter. See ‘M & A Advanced Preset’ on *page 7-51 for more information.*

## Specifying measurement and display options (continued)

### Moving the Results Window

To move the Result Window to a different location. Press **Set** key to display the arrow pointer. Move the arrow pointer by Trackball to the top-right icon in the Result Window and press **Set**. The Window then moves freely with the Trackball. Always press **Set** again to anchor the new location.

You may want to change where the Results Window is positioned on the monitor display. To move the Results Window, select the ***Options*** tab, then select ***Move Res Win***. The system displays the following choices:

- Left Top
- Right Top
- Right Bottom
- Left Bottom
- Extreme Right Top
- Extreme Right Bottom

Select the position you want.

## Specifying measurement and display options (continued)

### Trace Auto/Manual

To select Auto Doppler Trace or Manual Doppler Trace, select the ***Options*** tab, then select ***Trace***. Toggle between Auto and Manual Doppler Trace by pressing the touch panel control.

- Select AUTO – the system traces the Doppler waveform from the begin time to the end time.
- Select MANUAL – trace the waveform manually.

### Show Caliper Line

While you are making a measurement, the system displays a dotted line to show the measurement. After you press **Set** to complete the measurement, the dotted line remains on the display if the Show Caliper Line in the Options tab is selected. If Show Caliper Line is not selected, the system erases the dotted line and only the measurement calipers with a number or symbol are displayed. The Show Caliper Line on the Options tab takes precedence over the Cursor Line Display preset, found on the System -> System Measure screen.

## Specifying measurement and display options (continued)

### Post-assignment for Side/Location

1. Move the cursor to the result box (with the green frame) and press **Set**. The post-assignment menu appears.
2. Select Side and Location as needed.

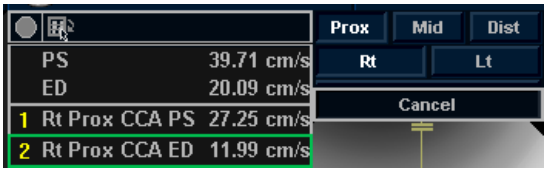



Figure 7-4. Post-assignment menu

*NOTE: This feature is only available in manual calcs.*

### Minimize/Maximize the Results Window

Move the arrow pointer by Trackball to the top-left icon in the Result Window and press **Set**. The Window is minimized and displays only the icons. Press **Set** again to maximize the display.

## Erasing measurements

The following actions erase measurements from the system's memory:

- If you adjust the Trackball, unfreeze the image, or press Clear, the system erases all completed measurements and calculations on the display. Measurements and calculations, however, remain on the worksheets.
- If you select New Patient, the system erases all measurements and calculations on the display and clears the worksheets.
- If you make a new measurement that exceeds the maximum number of allowable measurements, the system erases the first (oldest) measurement and adds the new measurement.
- If the second caliper is active, to erase the second caliper and activate the first caliper, press Clear.

## General Instructions (continued)

The following are actions you can take while performing measurements.

HINTS

- Before making measurements, to stop the acquisition of image data, press **Freeze**.
- For measurements such as distance, to make fine adjustments before completing the measurements, press the top Trackball key to toggle between active calipers.
- Before completing the measurement sequence, to erase the active measuring caliper and the current data measured, press **Clear**.
- After the sequence is complete, to erase all data that has been measured to this point, but not data entered on worksheet pages, press **Clear**.
- When there are several measurements on the display, to rotate through and activate previously fixed calipers, adjust the **Cursor Select** knob. After a cursor is activated, you can change the measurement.

  *NOTE: If you want to change a trace measurement, you must erase it and trace again.*
- To repeat any measurement, select that measurement again from the touch panel.

Calculation formulas are available in the *Advanced Reference Manual*.

# Measurement and Calculation Setup

Measurements and studies are organized for typical work flows. If you want, you can change this set up. You can specify which studies are in each exam category, and which measurements and calculations are in each study. You can change the measurements that are available on the touch panel. The LOGIQ S7 Expert/Pro allows you to quickly and easily set up your system so that you can work most efficiently.

This section describes how to:

- Change a study to include different measurements
- Add a new study or measurement
- Remove a study from an exam category
- Change measurement parameters
- Create a measurement formula to correctly handle unit conversions
- Edit user-defined calculations
- Define application-specific measurement parameters
- Specify the default manual calc measurements for a selected study or folder

## Starting Study and Measurement SetUp

You can make changes to studies and measurements in the Measurement & Analysis screen. To open the screen:

1. On the touch panel, select ***Utility***.
2. On the touch panel, select ***Measure***.
3. On the monitor display, select the *M & A* tab.

   The system displays the Measurement & Analysis screen on the monitor display.

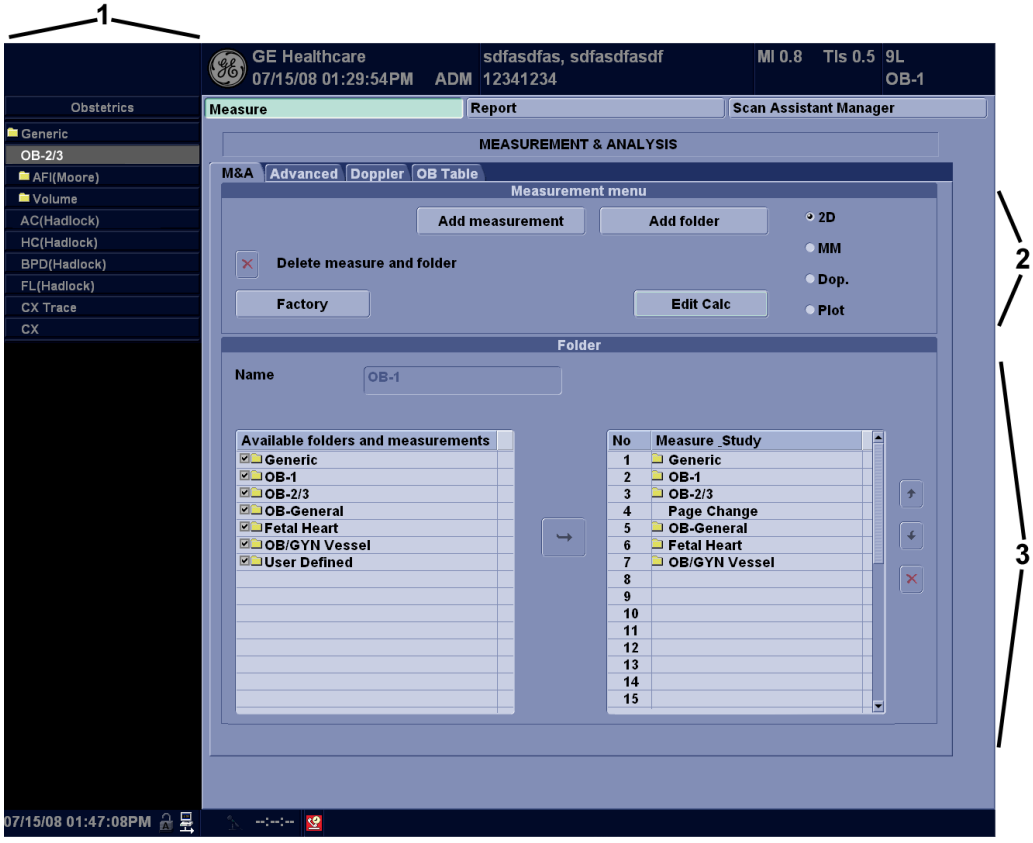



Figure 7-5. Measurement & Analysis screen

1. **Selection menu**: select exam category, study, or measurement.
2. **Measurement menu**: add and delete studies (folders) and measurements; select mode.
3. **Folder or measurement**: define studies and measurements. This section changes between Folder and Measurement, depending on what you select in the Selection menu.

*NOTE: In the Measure menu, the navigational tabs across the top may differ from system to system but the functionality is the same.*

## Selecting an exam category

When you open the Measurement & Analysis screen, it displays the exam category that was last used on the system. To select the exam category you want to work with:

1. Move the **Trackball** to highlight the exam category at the top of the Selection menu.
2. Press **Set**.

   The system displays a list of exam categories.
3. Move the **Trackball** to highlight the exam category you want.
4. Press **Set**.

The Selection menu lists studies and measurements for the selected exam category.

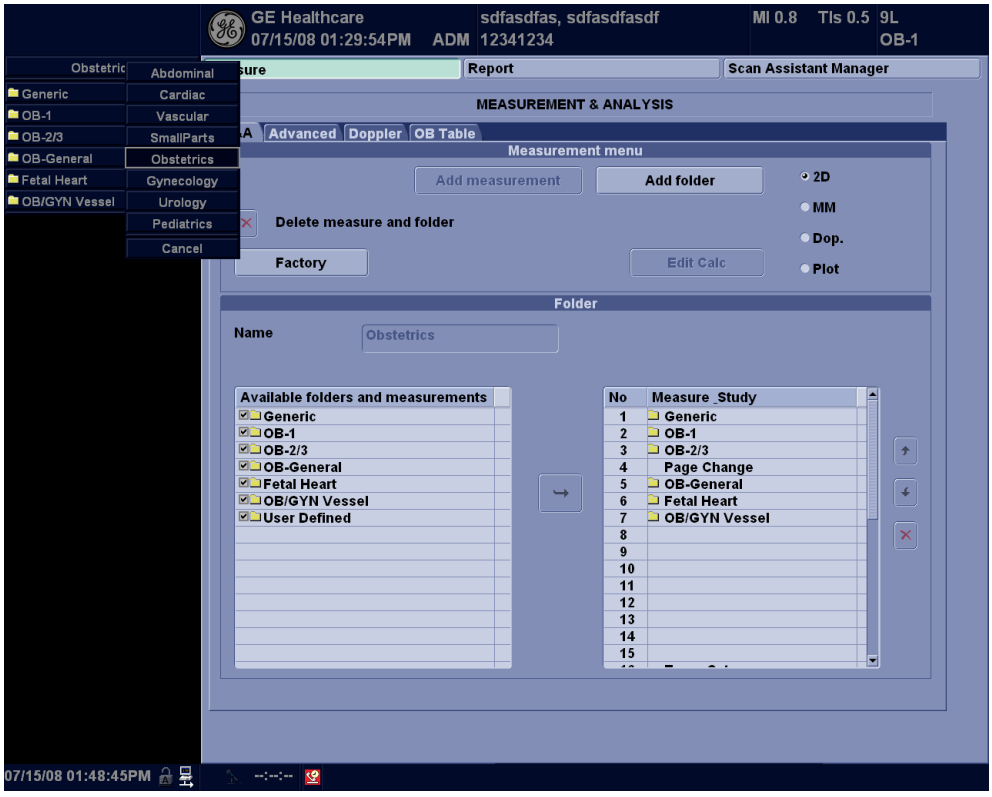



Figure 7-6. Select Exam Category

## Selecting the measurement mode

In the Measurement menu section of the Measurement & Analysis screen, select one of the following:

- 2D (B-Mode)
- MM (M-Mode)
- Dop (Doppler Mode)
- Plot (Plot Mode—The measurement on the plot graph of the TIC/QAnalysis)

The Selection menu lists studies and measurements for the selected mode.

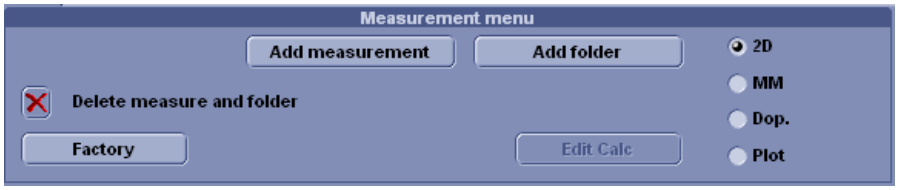



Figure 7-7. Select Mode

## Selecting a study or measurement

To work with a folder or measurement, you must first select it in the Selection menu. The Selection menu lists the studies and measurements for an exam category. The studies and measurements are organized in a hierarchy, in the same order that they are organized on the touch panel. The following example shows the highest level of the Obstetrics exam category, with the OB studies listed.

Figure 7-8. Selection Menu: Exam Studies

## Selecting a study or measurement (continued)

After you select a study, the Selection menu shows all folders and measurements in the study. The Folder section of the Measurement & Analysis screen changes, and lists the measurements. The Selection menu shows all measurements for the OB-1 exam category.

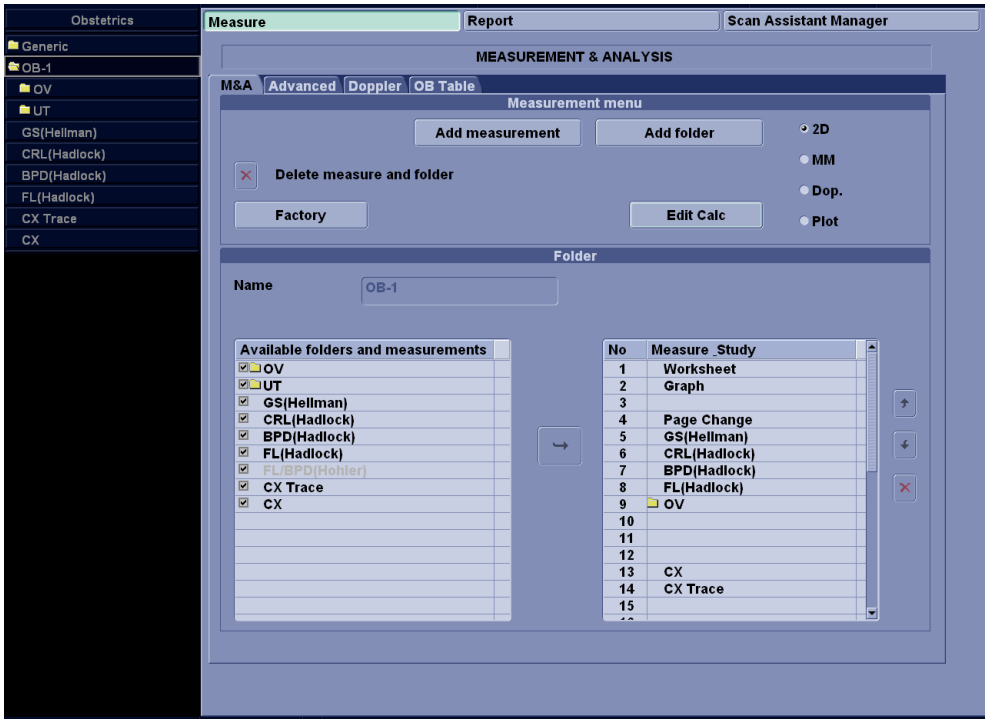



Figure 7-9. Selection Menu: OB-1 Exam Category

## Selecting a study or measurement (continued)

The following example shows the Selection menu after the BPD measurement is selected. The Measurement section is now displayed, with information about the BPD measurement.

Figure 7-10. Selection Menu: BPD Measurement

## Selecting a study or measurement (continued)

To select a folder or measurement:

1. Move the **Trackball** to the Selection menu and highlight the folder or measurement.
2. Press **Set**.
   - If you selected a folder, the system displays the folder in the Folder section of the Measurement & Analysis screen.
   - If you selected a measurement, the system displays the measurement in the Measurement section of the Measurement & Analysis screen.

NOTE: *Items must be selected in the Available folders and measurements list to be in the Selection menu. To move or change an item that is in the Available folders and measurements list but not in the Selection menu, move the **Trackball** to the check box for the item, and press **Set**. The item is now listed in the Selection menu.*

Figure 7-11. Available folders and measurements check boxes

## Using folders

When you select a folder in the Selection menu, the system displays all folders and measurements that are in the folder. A folder can indicate a study, or can indicate a measurement group that contains related measurements. For example, a calculation such as OB Amniotic Fluid Index (AFI) requires four measurements, one of each quadrant. The AFI folder contains four measurements.

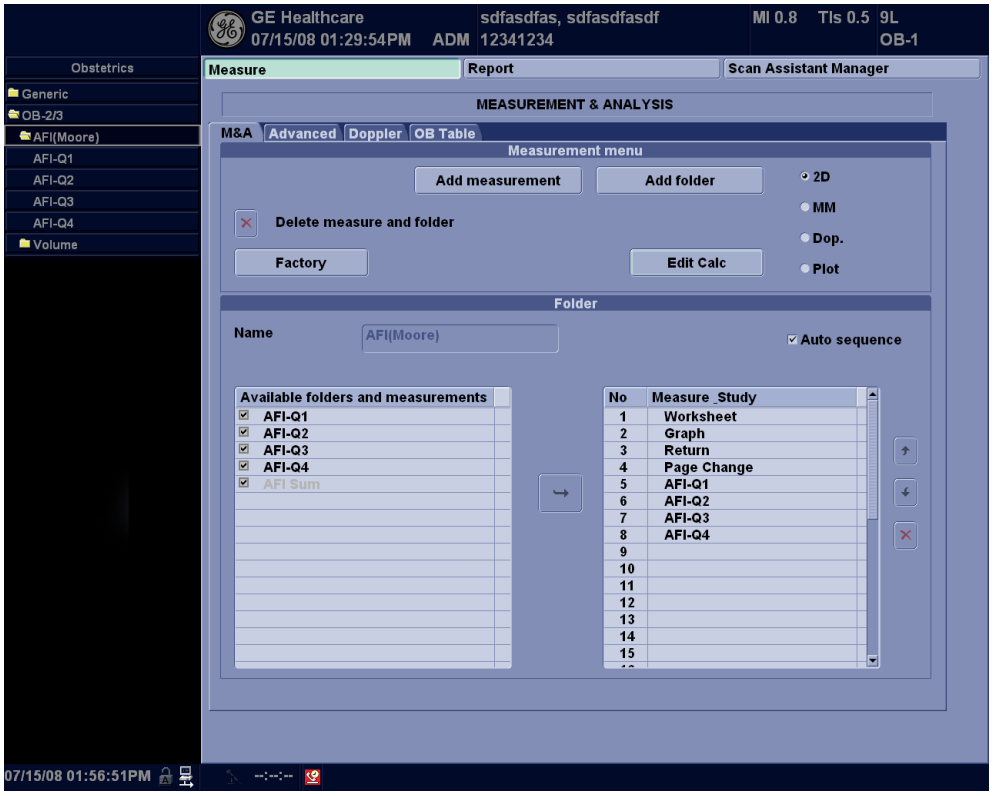



Figure 7-12. AFI Folder

## Specifying Which Measurements Go in a Study or Folder

The Folder section of the Measurement & Analysis screen has two lists of folders and measurements. This is where you specify which items go in a study or folder.

- **Available folders and measurements.** The left list contains all possible folders and measurements for the selected study or folder.
- **Measure & Study.** The right list has all folders and measurements currently selected for the study or folder. These are selected from the Available folders and measurements list. These are the folders and measurements you see when you are scanning and choose an exam category. This also defines where the folder or measurement is located on the touch panel, based on the number in this list.

## Specifying Which Measurements Go in a Study or Folder (continued)

To add an item to the Measure & Study list:

1. In the Measure & Study list, move the **Trackball** to highlight which folder you want to put the item in, and press **Set**.

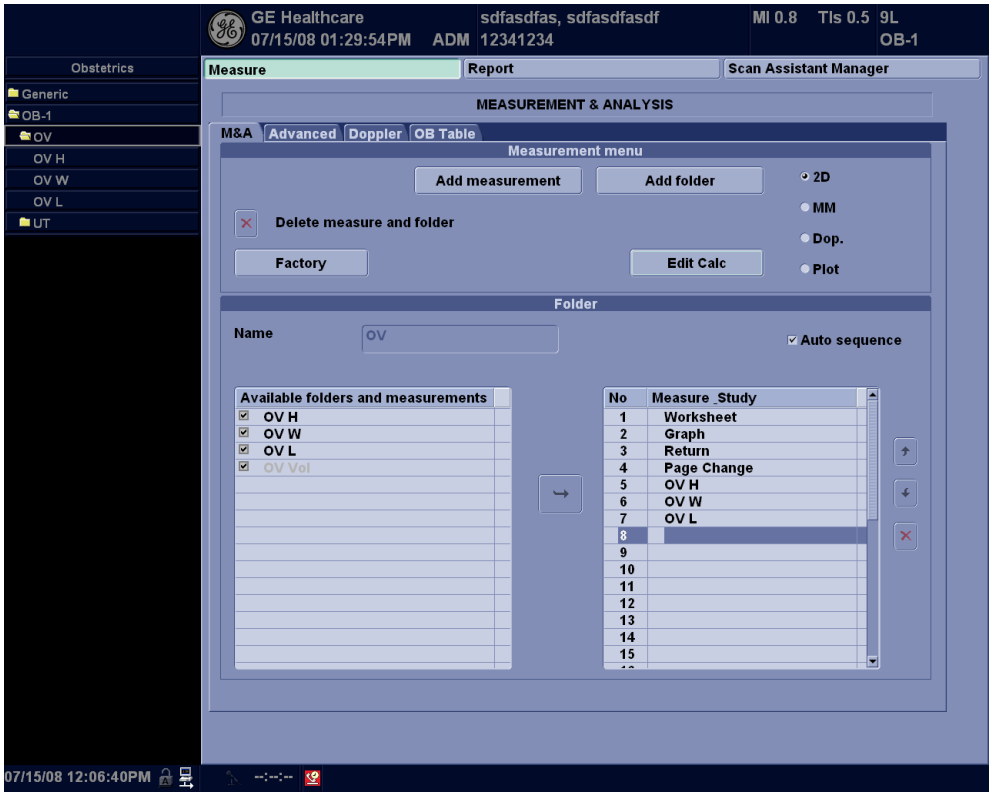



Figure 7-13. Measure & Study list: Selecting item and position

2. Move the **Trackball** to highlight an item in the Available folders and measurements list, and press **Set**.

## Specifying Which Measurements Go in a Study or Folder (continued)

3. Select the arrow between the lists. The item is copied to the Measure & Study list.

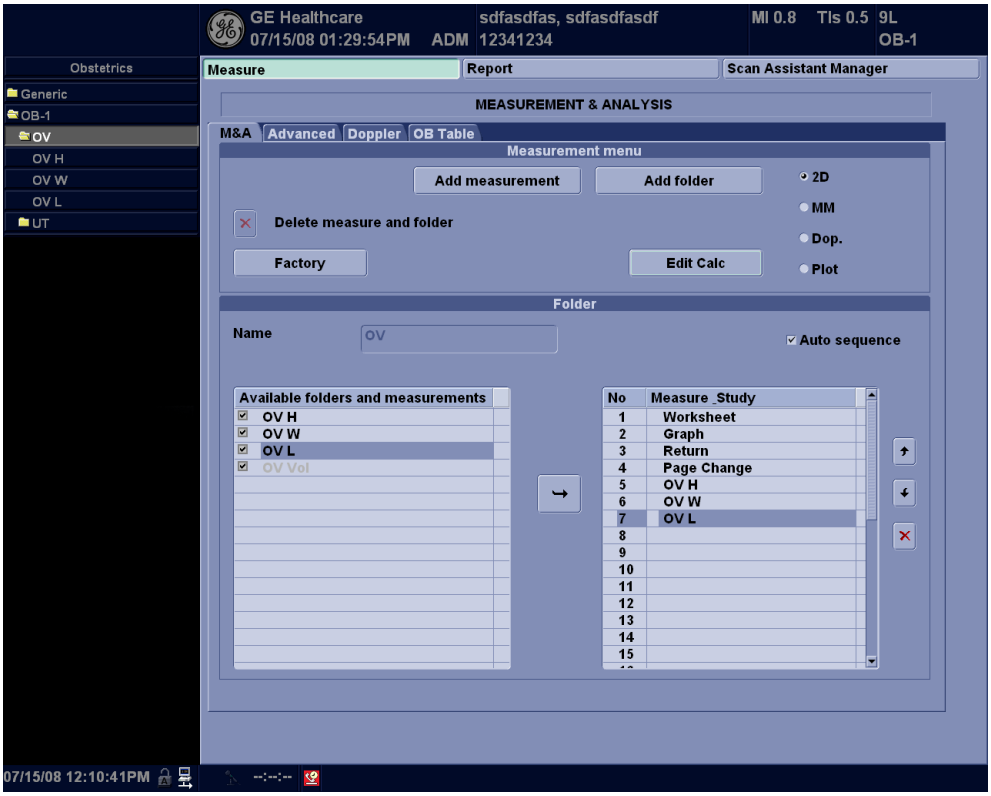



Figure 7-14. Measure & Study list: New item added

The selected item is now displayed in the touch panel and the Summary Window.

*NOTE: If an item is already in the Measure & Study list, the system does not allow you to add it again. To move an item within the Measure & Study list, See 'Moving items in the touch panel' on page 7-29 for more information.*

## touch panel positions

Each touch panel has 16 positions, four across and four down. The items in the first row across are numbered 1–4, in the second row 5–8, and so on. This figure shows the OB/GYN Vessel touch panel and a portion of the Measurement & Analysis screen for the OB/GYN Vessel. The numbers are shown in the Measure & Study list in the Measurement & Analysis screen. For example, the second row in the touch panel shows Prox, Aorta, Umbilical, and Placenta.

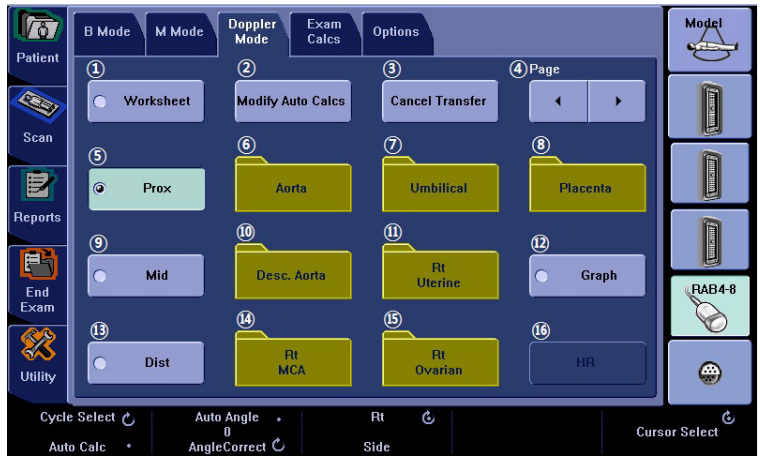



Figure 7-15. Measure & Study display with touch panel positions

*NOTE: Positions 1 through 4 are system programmed and cannot be changed.*

*Position 4 is blank when there is only one touch panel page. When a second page is available, "Page" is the fourth position which allows you to advance to the next/previous page.*

### Moving items in the touch panel

To move items that are in the touch panel, you move them in the Measure & Study list.

1. Move the **Trackball** to highlight an item in the Measure & Study list.
2. Select the up or down arrow.

   The item is displayed at the selected position in the touch panel.

*NOTE: Some items cannot be moved. For example, Worksheet and Page Change are in the same place on each touch panel.*

### Removing items from the touch panel

To remove items from the touch panel, you remove them from the Measure & Study list.

1. Move the **Trackball** to highlight the item in the Measure & Study list and press **Set**.
2. Select the X to the right of the list.

   The system removes the item from the Measure & Study list and from the touch panel. The item is still listed in the Available folders and measurements list.

Figure 7-16. Measurement & Analysis: Remove item from touch panel

## Removing items from the touch panel (continued)

To remove an item from the Selection menu:

1. Move the **Trackball** to the item in the Available folders and measurements list.
2. To clear the check box for the item, move the **Trackball** to the check box and press **Set**.

   The system removes the item from the Selection menu, the Measure & Study list, and from the touch panel. It is also not listed in the Summary Window.

## Setting up an automatic measurement flow

In some cases, related measurements are put in a measurement folder. This allows you to logically organize measurements. It also allows you to specify that the system automatically start each measurement in a folder, one after the other. This is the automatic sequence feature. To use this feature:

1. In the Selection menu, select the folder that contains the measurements you want.

   The system displays the folder and lists the measurements.

2. In the Folder section of the Measurement & Analysis screen, select Auto sequence. For OB-1 measurements, Uterine Volume measurements are put in the Uterine folder.

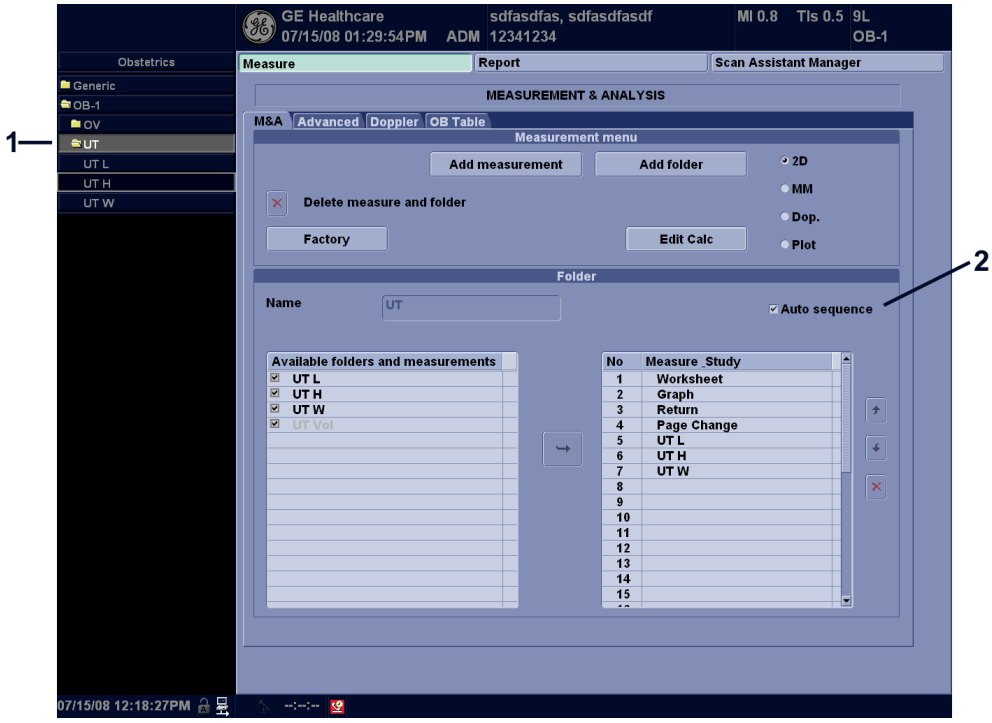



Figure 7-17. Measurement & Analysis screen: Auto sequence

1. Selection Menu
2. Auto Sequence

## Changing Measurements

You can make changes to some of the measurements. For example, Head Circumference can be measured with an ellipse, a trace, or two distances. You can specify which measurement type you want the system to use as the default. You specify the measurement type by selecting the tool to use to make the measurement.

- To change the tool used to make a measurement:

  In the Measurement section of the Measurement & Analysis screen, select the desired tool from the Tool list. Select the arrow to display the drop-down list.

*NOTE:* *If the Tool field is gray, it cannot be changed.*

After you choose the tool, this is what the system expects when you scan and choose this measurement.

*NOTE:* *The diagram to the right of the Tool list shows the measurement type. In the following example, ellipse is selected and the diagram shows an ellipse.*

## Changing Measurements (continued)

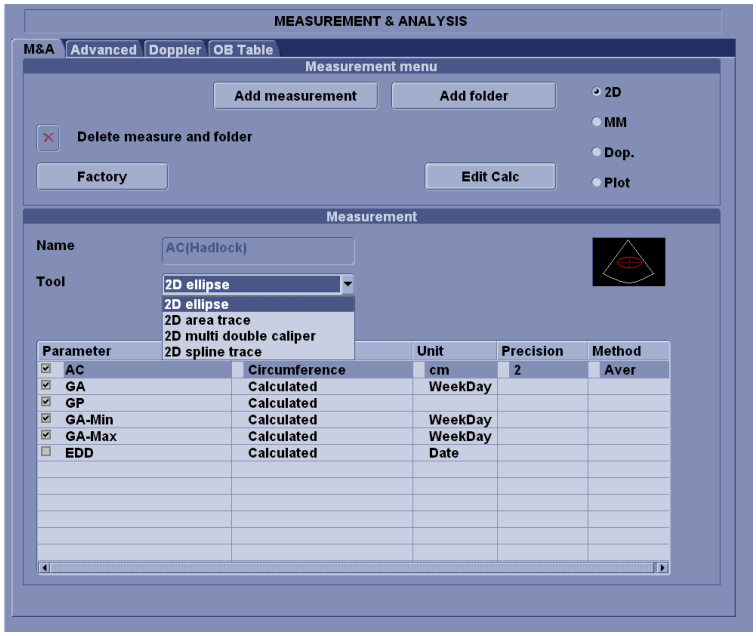



Figure 7-18. Measurement & Analysis screen: Change measurements

## Adding Folders and Measurements

### Adding a folder

When you add a folder, it can be a study, or a measurement folder that includes related measurements.

1. In the Selection menu, select the study or folder where you want to add the folder.
2. In the Measurement menu section, select Add folder.
   - If you select Blank, the system adds a folder with a name such as USERDEFS1. It is listed in the Selection menu.
   - If you want to use an existing folder, select Insert, and then select a folder from the list. The list includes all folders defined for the current exam category and selected mode. You cannot edit this folder.

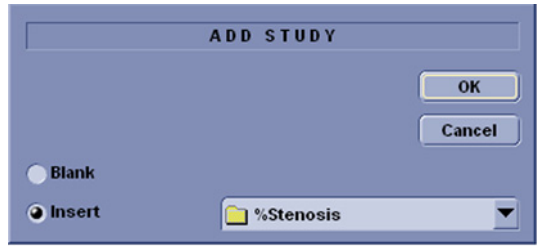



Figure 7-19. Add folder Window

3. Select the user-defined folder in the Selection menu.

   The system displays the new folder in the Folder section of the Measurement & Analysis screen.
4. To name the folder, move the **Trackball** to highlight the Name field, press **Set** twice, and type the name.

*NOTE:* *DO NOT use “single quotes” for a parameter name, a measurement name, a folder name or an author name.*

5. To add measurements to the folder, See ‘Adding a user-defined measurement’ on *page 7-37 for more information.*

## Adding a folder (continued)

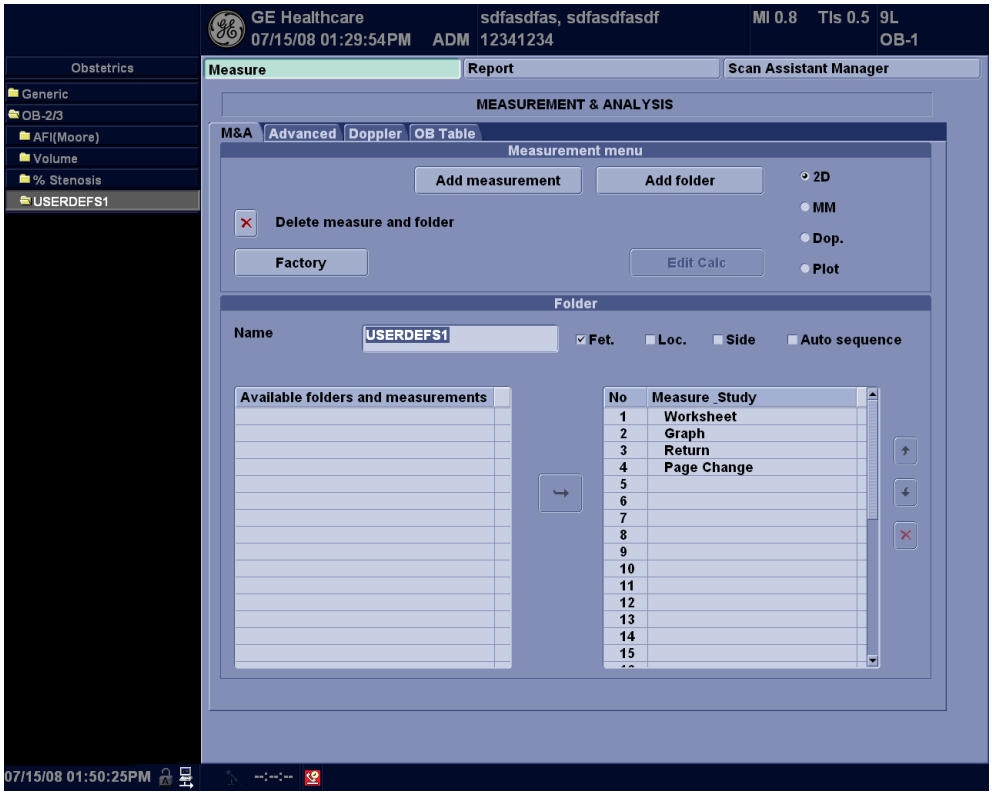



Figure 7-20. Measurement & Analysis: Add folder

## Adding a user-defined measurement

WARNING

Please remember that you are responsible for confirming the correctness and accuracy of the user input formula that you add.

You can create a user-defined measurement in a system-defined folder or in a folder you created.

*NOTE: DO NOT use "single quotes" for a parameter name, a measurement name, a folder name or an author name.*

1. In the Selection menu, select the study or folder where you want to add the measurement.
2. In the Measurement menu section, select Add measurement.

   The system displays the Add Measurement window.

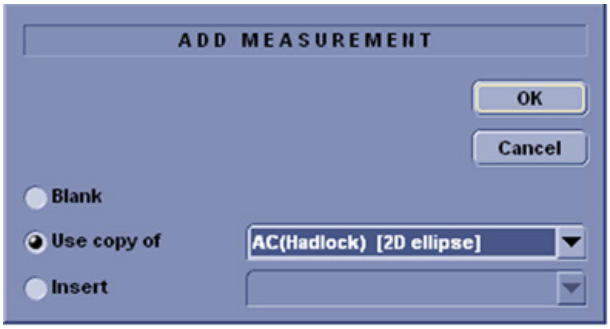



Figure 7-21. Add Measurement window

3. Do one of the following:
   - If you want to create this measurement from a copy of an existing measurement, select Use copy of, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode.

*NOTE: This only applies to OB and Cardiac.*

   - If you want to use an existing formula, select Insert, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode. You cannot edit this formula.
   - If you want to create a blank new measurement, select Blank.

## Adding a user-defined measurement (continued)

4. Select OK.
   - If you created a blank measurement, the system adds a measurement with a name such as USERDEFM3.
   - If you created a measurement from a copy of an existing measurement, the system lists the measurement and its parameters in the Measurement section.
5. When you create a new measurement, the measurement name is automatically highlighted. Type a name for the new measurement. You can change the name of a measurement you created from a copy.

Figure 7-22. Measurement & Analysis: Add measurement

## Adding a user-defined measurement (continued)

*NOTE: 2D Dual Caliper, 2D Dual Area, 2D Dual Ellipse, and 2D Dual Spline Trace are not available through the factory default. To enable these measurements, add a new measurement using "2D Dual Caliper", "2D Dual Area", 2D Dual Ellipse", or "2D Dual Spline Trace" tool.*

### Defining measurement parameters

After you add a measurement, you can add parameters. You may also want to change parameters if you copied an existing measurement. See 'Changing or adding measurement parameters' on *page 7-39 for more information.*

## Changing or adding measurement parameters

You can make changes to measurement parameters and you can add measurement parameters.

### Changing measurement parameters

To change a measurement parameter:

1. In the Selection menu, select the measurement.
2. To change the name of the Parameter, move the **Trackball** to the parameter name and press **Set** twice. Type a name for the parameter.

For a description of other measurement changes, See 'Changing Measurements' on *page 7-33 for more information.*

### Adding measurement parameters

To add a measurement parameter:

1. In the Selection menu, select the measurement.
2. To change the tool used to make a measurement:

   In the Measurement section of the Measurement & Analysis screen, select the desired tool from the Tool list. Select the arrow to display the drop-down list.

*NOTE: If the Tool field is gray, it cannot be changed.*

3. If necessary, check Fetus (OB only), Location (Loc), or Side:
   - Fetus: If this is an OB measurement, check this box. (Default ON).
   - Location: If this measurement includes a Prox, Mid, or Dist location, check this box.
   - Side: If this measurement includes a Left or Right side, check this box.
4. In the Measurement section, move the **Trackball** to an empty line at the bottom of the Parameter list. Press **Set**.

   The system adds a parameter with a name of (Name).

Figure 7-23. Adding a Parameter

**Adding measurement parameters (continued)**

5. To change the name of the Parameter, move the Trackball to the (Name) and press **Set** twice. Type a name for the parameter.
6. Move the **Trackball** to the Tool result field, and double click the **Set** key.

   The Edit Formula window is displayed.

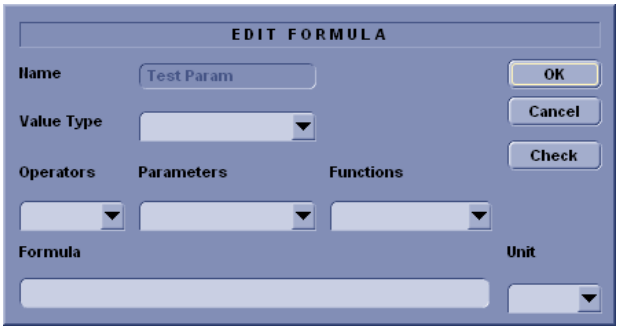



Figure 7-24. Edit Formula

7. To create a formula:
   a. In the Value Type field, select a value.
   b. Do one of the following:

   - Type a formula in the Formula field.
   - Select formula components from the Operators, Parameters, and Functions drop-down lists. When you select a component, the system displays it in the Formula field.

8. To test the formula, select Check.

   If there are no problems, the system displays “Syntax OK!”.

   If there are any problems with the formula, the system displays an Error message in place of the Formula field label.
9. When the formula is correct, select OK to save it.

   The Edit Formula window closes. The formula is displayed in the Tool result field.

### Formula Unit Conversion

When you create a formula, the system changes the calculation result into an output unit as defined in the following table.

Table 7-1: Formula Unit Conversion

| Unit | | Conversion (coefficient value) |
|---|---|---|
| Time | | |
| | s | x1 |
| | ms | x1,000 |
| | min | x0.0167 |
| | h | x0.00027778 |
| Ratio | | |
| | % | x100 |
| Frequency | | |
| | bpm or BPM | x1.0 |
| Angle | | |
| | rad | x1.0 |
| | deg | x57.2958 |
| | grad | x63.6620 |
| Distance | | |
| | cm | x100 |
| | m | x1 |
| | dm | x10 |
| | mm | x1,000 |
| | inch | x39.37 |
| | feet | x3.281 |
| | pixels | x1 |
| Velocity | | |

Table 7-1: Formula Unit Conversion (Continued)

| Unit | | Conversion (coefficient value) |
|---|---|---|
| | m/s | x1 |
| | dm/s | x10 |
| | cm/s | x100 |
| | mm/s | x1,000 |
| | inch/s | x39.37 |
| Acceleration | | |
| | m/s2 | x1 |
| | dm/s2 | x10 |
| | cm/s2 | x100 |
| | mm/s2 | x1,000 |
| | inch/s2 | x39.37 |
| Area | | |
| | m2 or m^2 | x1 |
| | dm2 | x100 |
| | cm2 or cm^2 | x10,000 |
| | mm2 or mm^2 | x1,000,000 |
| | inch2 | x1550 |
| Volume | | |
| | m3 | x1 |
| | dm3 | x1,000 |
| | cm3 | x1,000,000 |
| | l | x1,000 |
| | dl | x10,000 |
| | cl | x100,000 |
| | ml | x1,000,000 |
| | gallon | x264,178 |
| | quart | x1056.71 |
| Volume Flow | | |

Table 7-1: Formula Unit Conversion (Continued)

| Unit | | Conversion (coefficient value) |
|---|---|---|
| | m3/s | x1 |
| | dm3/s | x1,000 |
| | cm3/s | x1,000,000 |
| | l/s | x1,000 |
| | dl/s | x10,000 |
| | cl/s | x100,000 |
| | ml/s | x1,000,000 |
| | m3/min | x60 |
| | dm3/min | x60,000 |
| | cm3/min | x60,000,000 |
| | l/min or L/min | x60,000 |
| | dl/min | x600,000 |
| | cl/min | x6,000,000 |
| | ml/min | x60,000,000 |
| | ml/m2 | x1,000,000 |
| Pressure | | |
| | mmHg | x1 |
| | Pa | x133.322 |
| | kPa | x0.133322 |
| | bar | x0.00133322 |
| Pressure/Time | | |
| | mmHg/s | x1 |
| Mass | | |
| | kg | x1 |
| | g | x1,000 |
| | ounce | x35.273962 |
| | pound | x2.2046226 |
| Others | | |
| | mmHg | x1 |

**Formula Unit Conversion (continued)**

For example, when a Volume formula is created:

Vol [ml or cm3] = 0.523598*{D1}*{D2}*{D3}

(D1, D2, and D3 indicate a measurement result.)

In this case, the measurement (D1, D2, and D3) is a distance measurement, so the measured data is a meter [m] unit according to the above table.

To change into a milliliter, the system multiplies each measurement value by 100. As a result, it multiplies a formula by 1,000,000.

The standard unit of volume is a cube meter, so the system multiplies the result by 1,000,000.

The system multiplies the calculation result by the coefficient and converts it. To get a correct result, when you define the formula, you must convert the coefficient itself, such as the coefficient of 10^.

For example, if you want to define the following formula:

efg[g] = 10^(1.5662-0.0108*{P1}+0.0468*{P2}+0.171*{D1}+0.00034*{P1}*{P1}-0.003685*{P2}*{D1})

D1[cm]: Distance

P1[cm]: Perimeter

P2[cm]: Perimeter

**Formula Unit Conversion (continued)**

The system defines the standard value of each measurement as a meter [m]. If the unit of each measurement value of this formula is defined as centimeter [cm], you must define the formula as follows:

efw[g] = 10^(1.5662-0.0108*{P1}*100 + 0.0468*{P2}*100 + 0.171*{D1}*100 + 0.00034*{P1}*{P1}*100*100 - 0.003685*{P2}*{D1}*100*100)

(This converts each measurement value to a centimeter [cm], since the system standard unit is a meter [m].)

The output unit of this formula is a gram. Since the standard unit of the system is defined as a kilogram [kg], the system multiplies the output by 1,000.

Because the output of this formula is defined as a gram, it is necessary to define the formula as follows.

efw[g] = 10^(1.5662-0.0108*{P1}*100 + 0.0468*{P2}*100 + 0.171*{D1}*100 + 0.00034*{P1}*{P1}*100*100 - 0.003685*{P2}*{D1}*100*100)/1,000

As shown, you can obtain an exact calculation result.

## Editing Calculations

To modify user-defined calculations:

1. Select Add Measurement from the Measurement menu. The system displays the Add Measurement window.
2. Select Blank and OK.
3. Type the appropriate name and select “Calculation” from the Tool pull-down menu.

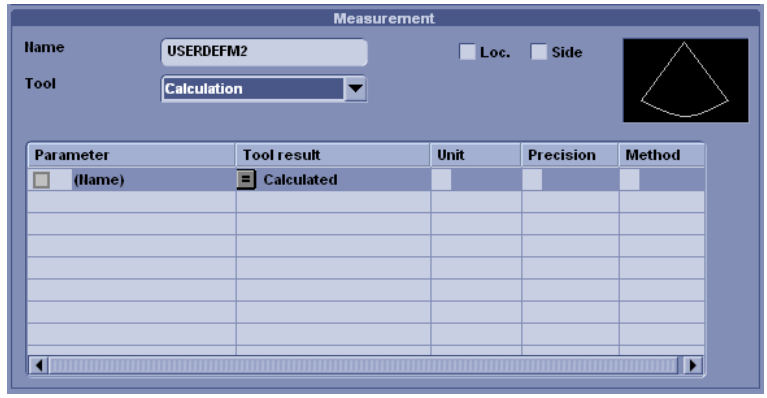



Figure 7-25. Measurement window

4. Type the parameter name.
5. Double click on the = Calculated symbol under Tool Result. The Edit Formula window displays.
6. Select OK.

## Editing Calculations (continued)

7. In the Measurement menu section, select *Edit Calc*.

Figure 7-26. Edit Calc

The Modify User CALC window displays.

## Editing Calculations (continued)

8. In the User Defined list, select the calculation that you want modified, then select OK.

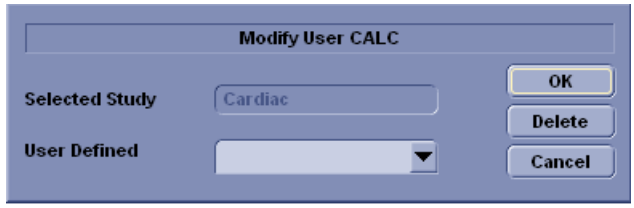



Figure 7-27. Modify User CALC window

9. The Measure tab for user-defined calculations displays. Double click on the equals sign symbol under Tool Result for the desired parameter.

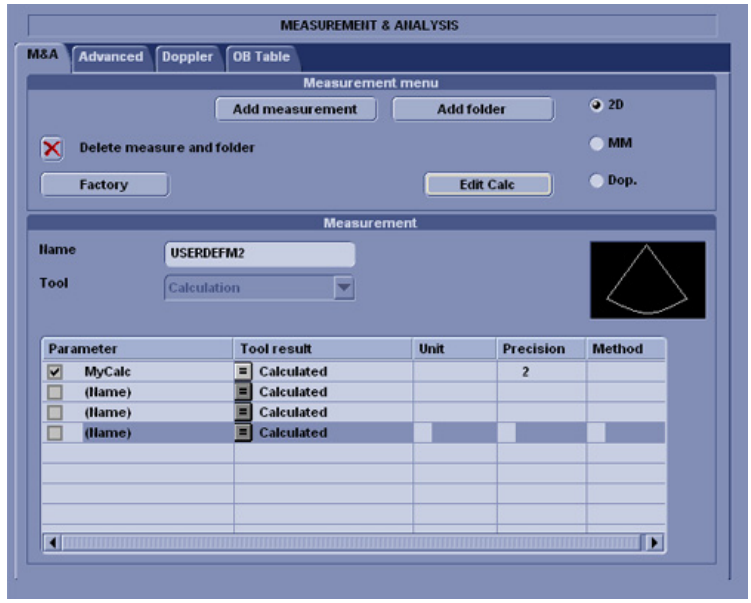



Figure 7-28. Measurement & Analysis M&A tab

10. Edit the formula as needed and select OK.

### Deleting a Folder or Measurement

*NOTE: You can only delete user-defined folders or measurements. You cannot delete default system folders or measurements.*

1. Select the folder or measurement in the Selection menu.
2. In the Measurement menu section, select the X next to Delete measure and study.

## M & A Advanced Preset

The system allows you to specify application-specific values for certain parameters. You specify the parameter values on the Advanced tab of the Measurement & Analysis screen.

1. On the touch panel, select ***Utility***.
2. On the touch panel, select ***Measure***.
3. On the monitor display, select the Advanced tab.

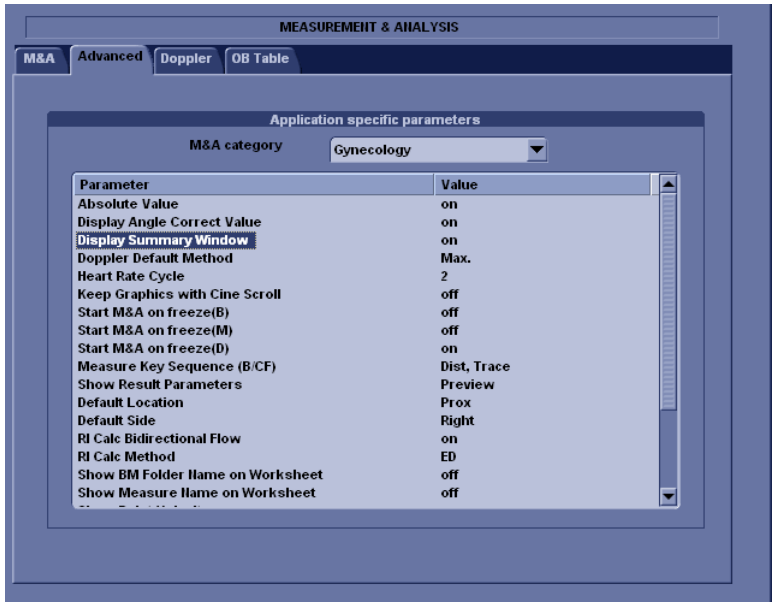



Figure 7-29. M&A Advanced Preset Menu

**M&A Category**: Display and select current exam category.

**Parameter**: Lists application specific parameters.

**Value**: Select the value for a parameter.

4. To select an exam category, select it from the M&A category list.

   The Parameters list displays parameters for the selected category.

## M & A Advanced Preset (continued)

5. To select a value for a parameter, select it from the Value list.

*NOTE: The parameters that appear are category dependent.*

Table 7-2: M&A Advanced

| Preset Parameter | Description |
|---|---|
| Absolute Value | Displays the absolute value of the Doppler Velocity measurement (On or Off) |
| Display Angle Correct Value | On or Off |
| Display Summary Window | On or Off |
| Doppler Default Method | Avg, Max, Min or Last |
| Heart Rate Cycle | 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10<br>*NOTE: For Cardiac, you can select only "1".* |
| Keep Graphics with Cine Scroll | If you select "On", the measurement graphics remain while in CINE scroll. The measurement graphic redisplays on the frame where the measurement was taken in B-Mode. |
| Start M&A on a Freeze (B) | Off: Select measurement manually on Freeze<br>On: Measurement menu appears automatically on Freeze.<br>Caliper: Measurement menu and caliper appear automatically on Freeze. |
| Start M&A on a Freeze (M) | |
| Start M&A on a Freeze (D) | |
| Measure Key Sequence (B/CF) | 2 Sequences: Dist, Trace; Dist, Spline<br>2 Sequences: Dist, Open Trace; Dist, Open Spline<br>3 Sequences: Dist, Trace, Spline; Dist, Spline, Trace; Dist, Spline, Intensity; Dist, Trace, Intensity; Dist, Trace, Open Trace; Dist, Spline, Open Trace<br>4 Sequences: Dist, Trace, Spline, Intensity; Dist, Spline, Trace, Intensity; Dist, Spline, Trace, Open Trace; Dist, Trace, Open Trace, Spline |

Table 7-2: M&A Advanced (Continued)

| Preset Parameter | Description |
|---|---|
| Show Result Parameters | Preview or After Set cursor:<br>Preview: Displays while taking the measurement.<br>After Set Cursor: Displays after completing the measurement. |
| Default Location | Off, Prox, Mid or Dist |
| Default Side | Left, Right or Off |
| RI Calc Bidirectional Flow | On or Off |
| RI Calc Method | MD or ED |
| Show BM Folder Name on Worksheet | On or Off |
| Show Location Select Button | Both on B and Doppler, Doppler only or No Display<br>NOTE1: Only Abdominal, Vascular, Obstetrics and Gynecology have this preset.<br>NOTE2: For Obstetrics and Gynecology, you can select only Doppler only or No Dipslay. |
| Show Measure Name on Worksheet | On or Off |
| Show Point Velocity | On or Off |
| Show Tissue Depth | On or Off |
| Keep Result Window | On, Off or Auto |
| Trace | Auto or manual |
| Show area value when tracing | On or Off |
| Vol Flow Method | TAMEAN or TAMAX |
| Vol Flow Compensation with TAMAX | If you select TAMAX as the volume flow method, then you MUST specify the coefficient to use. Select from 0.5 to 1.0. |
| Worksheet Default Display | Mode/Expand (Abdominal, Small Parts, Obstetrics, Gynecology, Urology and Pediatrics) or Worksheet Summary (Vascular) |
| Doppler AutoCalc Velocity Unit | Velocity, Hz, Both or Auto |

Table 7-2: M&A Advanced (Continued)

| Preset Parameter | Description |
|---|---|
| WMS Freeze Loop at ES | On or Off |
| WMS Segment Model | 16 segments or 18 segments |
| WMS Initial Scoring | Undefined or Normal |
| WMS Scoring Legend | ASE, European or Asian |
| Hip Orientation | Cranial-left or Caudal-left |

## Manual Calcs Presets

The system allows you to preset the parameters for manual calculations. You specify the parameter values on the Doppler tab of the Measurement & Analysis screen.

1. On the touch panel, select ***Utility***.
2. On the touch panel, select ***Measure***.
3. On the monitor display, select the Doppler tab.

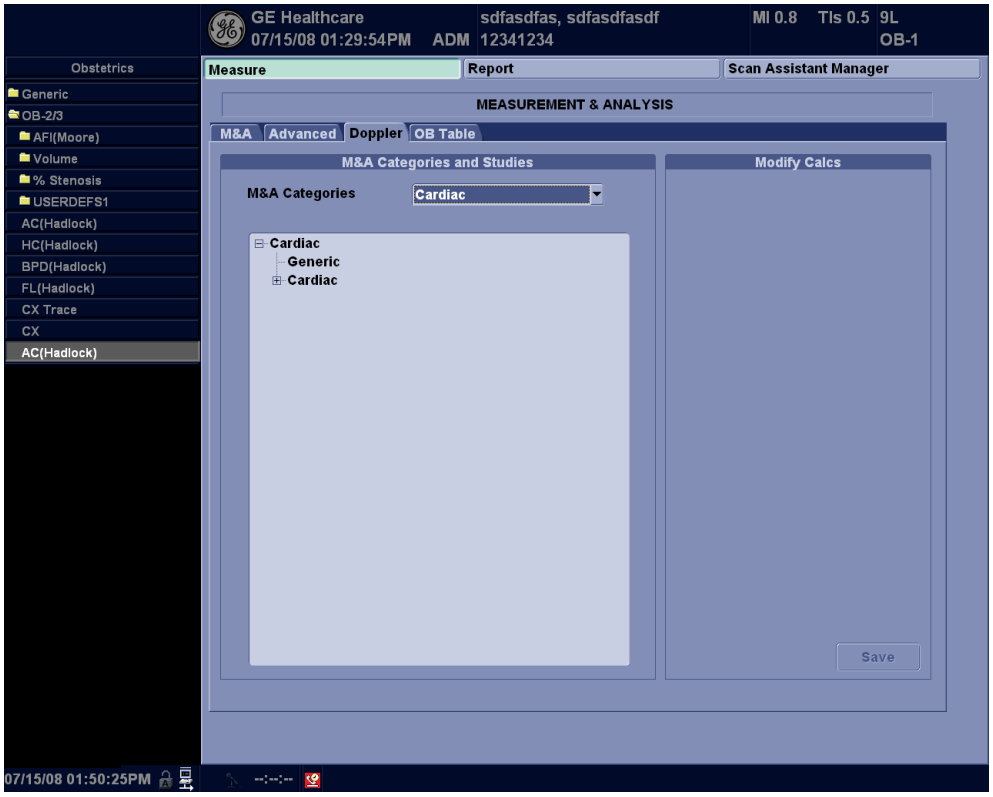



Figure 7-30. M&A Doppler Preset Menu

**M&A Category**: Display and select current exam category.

## Manual Calcs Presets (continued)

4. To select an exam category, select it from the M&A category list.

   The system displays a hierarchical view of the exam category and the studies and folders in the category.
5. In the hierarchical view, select a study or folder.
6. In the Modify Calcs column, select the measurements that you want to the system to show for manual calcs for the selected study or folder.
7. To save the changes, select the Save button.

## Application Measurement Preset

The Application Measurement presets allow different calculation packages to be available under different application presets.

The presets allow you to configure the Measurement Categories and Measurement Exam Calcs. These presets are found on the Utility -> Application -> Measurements screen.

Figure 7-31. Application Measurements Menu

# Mode Measurements

## B-Mode Measurements

Two basic measurements can be made in B-Mode.

- Distance
- Circumference and Area
  - Ellipse Method
  - Trace Method
  - Spline Method

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

## Distance measurement

To make a distance measurement:

1. Press **Measure**.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points, if preset accordingly.
5. To complete the measurement, press **Set**.

   The system displays the distance value in the Results Window.

The following hints can help you to perform distance measurements:

HINTS

- **Before** you complete a measurement:
  - To toggle between active calipers, press the top Trackball key.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- **After** you complete the measurement:
  - To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
  - To erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

### Circumference and area (ellipse) measurement

You can use an ellipse to measure circumference and area. To measure with an ellipse:

1. Press **Measure**.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
6. To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
7. To increase the size, adjust the **Ellipse** control in a clockwise direction. To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
8. To toggle between active calipers, press the top **Trackball key**.
9. To complete the measurement, press **Set**. The system displays the circumference and area in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

## Circumference and area (trace) measurement

### Trace

To trace the circumference of a portion of the anatomy and calculate its area:

1. Press **Measure**.
2. Press the top **Trackball key** to select Trace; a caliper displays.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
6. To complete the measurement, press **Set**. The system displays the circumference and the area in the Results Window.

## Circumference and area (trace) measurement (continued)

### Open Trace

To trace the circumference of a portion of the anatomy and calculate its length:

1. Press **Measure**.
2. Press the top **Trackball key** to select ***Trace***; a caliper displays.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
6. To complete the measurement, press **Set**. The system displays the circumference and the length in the Results Window.

HINTS

Before you complete the trace measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the dotted line but not the caliper, press **Clear** once.
- To clear the caliper and the current data measured, press **Clear** twice.

### Circumference and area (spline trace) measurement

To trace the circumference of a portion of the anatomy and calculate its area:

1. Press **Measure**.
2. Press the top **Trackball key** to select Spline Trace; a caliper displays.
3. To position the first caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The first caliper turns yellow. The second caliper appears at the same position as the first caliper and is green.

*NOTE: When pressing the **Clear** key once, the second caliper disappears and the first caliper is activated.*

*If **Clear** is pressed again, the first caliper disappears and the Spline trace is cancelled.*

5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.

*NOTE: The **Clear** key functionality is the same as noted in the previous step.*

The spline trace requires at least three points to draw the trace. Continue setting the points of the trace until the desired points are set.

6. Press **Set** again after the last caliper is fixed to finalize the spline trace. All points are removed from the line and the spline trace turns yellow.

*NOTE: Pressing **Set** twice finishes the trace measurement.*

If **Clear** is pressed twice when more than 3 points exist on the trace, all points are removed and the first caliper again displays.

*NOTE: Spline trace is not available through the factory default. The system defaults to trace. To enable spline trace, modify the Measure Key Sequence preset found in Utility -> Measure -> Advanced preset menu.*

## Circumference and area (spline trace) measurement (continued)

### Edit the spline trace

1. Select ***Cursor Select***. The spline trace changes to green and all points appear on the trace as yellow.

   A pick-caliper appears on the center of the image and the message “Edit spline trace” displays at the bottom of the screen.

*NOTE: The pick-caliper is used to select and move the trace points.*

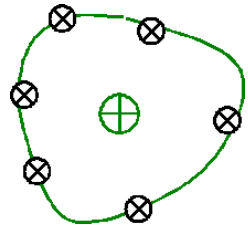


Figure 7-32. Edit spline trace

Select Cursor Select again. The trace is deactivated (changes to yellow) and all points, including the pick-caliper, are removed.

If the previous/next fixed caliper exists on the image, it is activated.

*NOTE: Pressing **Clear** at this time removes all points and the trace graphic.*

2. Move the pick-caliper to the desired point and press **Set**. The point is activated and turns green.
3. Move the point to the desired position and press **Set**. The point is fixed and turns yellow. The pick-caliper appears on the center of the image.

*NOTE: The spline trace is updated at run time.*

*NOTE: To remove a point, press **Clear** while moving the point. The trace turns green and the remaining points continue to be shown as yellow. If there are less than three points, the spline trace is removed.*

4. Press **Set** again. All points are removed from the trace and the trace is shown as yellow.

### Intensity (Echo level) measurement

To make an echo level measurement:

1. Press **Measure**.
2. Press the top Trackball key to select Intensity. A caliper displays.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
6. To complete the measurement, press **Set**. The system displays the echo level in the Results Window.

*NOTE: The echo level measurement is only available on a frozen image, not on a B-paused image.*

*NOTE: Echo Level is not available through the factory default. To enable echo level, modify the Measure Key Sequence preset, found in the Utility -> Measure -> Advanced preset.*

## 2D Dual caliper

*NOTE: 2D dual caliper / 2D dual area / 2D dual ellipse / 2D dual spline trace / 2D dual circle are not available through the factory default. To enable these measurements, add new measurement using “2D dual caliper”, “2D dual area”, “2D dual ellipse”, “2D dual splinetrace” or “2D dual circle” tool in the Utility -> Measure -> M&A preset menu.*

You can take a measurement on dual images with B and B mode, on dual images with B and CF mode, with simultaneous mode or on dual images with live image with 2D dual measurements.

1. Select an added measurement from the touch panel to enable the appropriate measurement. A caliper displays.

*NOTE: When the measurement is selected without dual B images or with different probe images, warning message is displayed on the status bar, and the selected measurement is canceled.*

2. To position the caliper at the start point, move the **Trackball**.

   You can use both images as an original image.

*NOTE: If the first point of the original graphic is out of the shadow image area, then the warning message displays on the status bar and the shadow graphic is not drawn.*

3. To fix the start point, press **Set**. The caliper changes to an active caliper.

*NOTE: Only original graphic has graphic numbering to distinguish between original image and shadow image.*

*NOTE: The trackball move area is limited to the narrow area of both images.*

*NOTE: Only the original graphic can be edited. When the original graphic is edited, the shadow graphic is also updated*

4. To complete the measurement, press **Set**. The system displays the measurement result in the Results Window.

*NOTE: It's impossible to take a measurement across dual images.*

*NOTE: 2D Dual measurement tool can not be copied.*

*NOTE: When one of them (original and shadow) is deleted, then both graphic are deleted.*

## Doppler Mode Measurements

Four basic measurements can be made in Doppler Mode.

- Velocity
- TAMAX and TAMEAN (Manual or Auto Trace)
- Two Velocities with the Time Interval and Acceleration between them
- Time Interval
- Volume Flow

*NOTE: The following instructions assume that you do the following:*

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

### Velocity

To measure velocity:

1. Press **Measure**; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**. The system displays the velocity measurement in the Results Window.

### Slope (Velocity, Time Interval and Acceleration)

To measure two velocity values, the time interval (ms), and acceleration ($m/s^2$):

1. Press **Measure**. Press the top Trackball key to select Slope; an active caliper with vertical and horizontal dotted lines displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the two peak end point velocities, the time interval, and the acceleration in the Results Window.

### Time interval

To measure a horizontal time interval:

1. Press **Measure**. Press the top Trackball key to select Time; an active caliper with vertical and horizontal dotted lines displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

## TAMAX and TAMEAN

### Manual Trace

The value measured depends upon the Vol Flow Method preset. The two selections available are: Peak (TAMAX) and Mean (TAMEAN).

To do a manual trace of TAMAX or TAMEAN:

1. Press **Measure**. Press the top Trackball key to select Trace; a caliper displays. Select ***Manual*** on the touch panel.
2. To position the caliper at the trace start point, move the **Trackball**.
3. To fix the start point, press **Set**.
4. To trace the maximum values of the desired portion of the spectrum, move the **Trackball**.

   *NOTE: To edit the trace line, move the* **Trackball**.
5. To complete the measurement, press **Set**. The system displays the measurement values in the Results Window.

## TAMAX and TAMEAN (continued)

### Auto Trace

The value measured depends upon the Vol Flow Method preset. The two selections available are: Peak (TAMAX) and Mean (TAMEAN).

To auto trace TAMAX:

1. Press **Measure**. Press the top Trackball key to select Trace; an active caliper with a vertical dotted line displays. Select ***Auto*** on the touch panel.
2. To position the caliper at the trace start point in the Doppler spectrum, move the **Trackball**.
3. To fix the start point, press **Set**.
4. To position the vertical caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system automatically fixes both calipers and traces the maximum value between the two points. The system displays this value in the Results Window.

*NOTE: When you set the Auto Trace for Both (above and below), the system picks up the maximum power of the signal, NOT the maximum velocity. If the maximum velocity is not the maximum power, the system may not trace accurately. If you want to use maximum velocity, select either Above or Below.*

**Edit Trace**

Auto Trace can be edited after taking an Auto Trace measurement.

1. After taking an Auto Trace measurement, select the measurement result on the result window. The Edit Trace (Edit Peak or Edit Mean) menu window appears.

*NOTE: If the system cannot take the trace data correctly from the image, Edit Trace does not work.*

2. Select Edit Trace. The first caliper (manual trace caliper) appears on the center of the image. Use the **Trackball** to move the caliper on the trace line to the start point.

*NOTE: To cancel Edit Trace at this time, press **Clear**, **Scan**, or **Freeze**.*

3. Press **Set** to fix the first caliper. The second caliper appears. Edit the trace manually using the second caliper.

   The Ellipse control is used to edit the trace.

*NOTE: When pressing the **Clear** key once at this time, the second caliper disappears and the first caliper appears in the center of the image.*

*NOTE: If you press **Scan** or **Freeze** at this time, the caliper is automatically fixed and the result window updates.*

4. Press **Set** to fix the second caliper. The trace and the result window update. The trace data (TAMAX and TAMEAN) are updated, though the other points (e.g. PS, ED) are not updated by trace. The points can be edited with ***Cursor Select***.

*NOTE: While in Edit Trace, Cursor Select is disabled.*

5. Repeat Edit Trace as needed.

### Doppler Auto Calc Average Cycle

When using Auto Calc, a selection is available to average a number of cycles automatically. There is also a preset selection in the Utility Imaging PW page for this feature. When using average cycle:

- Selected cardiac cycle lines display on the image. Point calipers are not displayed.
- When changing the number of cycles from 1 to >1, all the data is reacquired from the image, recalculated and updated.
- When multiple cycles are selected in AutoCalc, the average values calculate and display automatically.
- When selecting Peak Value (PV), average cycle is not available.

*NOTE: You cannot edit the lines while in Average Cycle. Cursor Select is not available at that time.*

*NOTE: Average Cycle data is acquired from the display image area only, for both live and frozen. The average cycle data fails if the setting for the number of cycles is larger than the number of image cycles.*

Figure 7-33. PW touch panel (Page 2)

## Volume Flow - Manual Calc

You perform a manual Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation.

1. To perform the Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation, in Utility-->Measure-->Advanced, select the following:
   - Trace = Manual
   - Vol Flow Method = TAMAX [you MUST also select a Volume Flow coefficient for use with TAMAX.]
   - Vol Flow Compensation with TAMAX = [select value from 0.5 to 1.0]
2. Set Auto Calcs to Off via Doppler Mode-->Modify Auto Calcs-->Off.
3. Select a folder in Doppler Mode-->select a calculation folder-->select Show All.
4. Select ***Volume Flow***. You'll notice that TAMAX is automatically selected.

*NOTE: Ensure that you have placed the caliper in the spectral window when selecting the Volume Flow measurement.*

5. Trace the TAMAX. The system prompts you to "Mark the first point on the spectral doppler." Press **Set**.
6. The system prompts you to "Trace the velocity spectrum boundary." Press **Set**.

*NOTE: You can back up while tracing the TAMAX by using the Trackball.*

7. Trace the vessel diameter. The system prompts you to "Mark first point of vessel diameter for volume flow calculation." Press **Set**.
8. The system prompts you to "Mark last point of vessel diameter for volume flow calculation." Press **Set**.
9. The Volume Flow is calculated in ml/min.

## Volume Flow - Auto Calc

You can perform an automatic Volume Flow measurement using TAMEAN or using the TAMAX and a Volume Flow coefficient.

1. To perform the Volume Flow measurement using the TAMEAN, in Utility-->Measure-->Advanced, select the following:
   - Trace = Auto
   - Vol Flow Method = TAMEAN

   OR, to perform the Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation, select the following:
   - Trace = Auto
   - Vol Flow Method = TAMAX [if you use TAMAX, you MUST also select a Volume Flow coefficient for use with TAMAX.]
   - Vol Flow Compensation with TAMAX = [select value from 0.5 to 1.0]
2. Set Auto Calcs to Live via Doppler Mode-->Modify Auto Calcs-->Live.
3. Perform the scan.
4. Select ***Volume Flow*** via Doppler Mode-->Modify Auto Calcs-->VOLUME FLOW. The system prompts you through the measurement.
5. Take vessel diameter for volume flow calculation. Set the first cursor.
6. Mark last point of vessel diameter for volume flow calculation. Press **Set**.
7. The calculation automatically completes the Volume Flow measurements as ml/min.

*NOTE: If you change the TAMAX coefficient, the Volume Flow is automatically adjusted when in Auto Calcs (but not in Manual Calcs).*

## Flow Volume (FV)

Flow Volume estimates the volume of blood that flows through a vessel per unit time. It is derived from a vessel's cross-sectional diameter obtained from the B-Mode portion of the image and the mean velocity of flow in the vessel obtained from the Doppler portion of the image. It is measured in milliliters. When the FV measurement is made, FVO is automatically calculated.

To measure flow volume:

1. Select **FV** from Doppler touch panel.
2. Place the dotted horizontal line caliper at each of the time base on the Doppler spectrum.
   - If Trace Auto is selected, the waveform is automatically traced.
   - If Trace Auto is not selected, manually trace the desired portion of the waveform.

     The caliper moves to the B-Mode area.
3. Use the Ellipse or Trace method to measure the circumference and area of the vessel.

   The flow volume (FV) is calculated and displayed in milliliters. The flow volume output (FVO) is also calculated and displayed in milliliters/minute.

## Flow Volume Output (FVO)

This measurement is used to measure the flow volume output in a vessel on the Doppler spectrum. It is measured in milliliters/minute. When the FVO measurement is made, FV is automatically calculated.

## M-Mode Measurements

Basic measurements that can be taken in the M-Mode portion of the display are:

- Tissue Depth (Distance)
- Time Interval
- Time Interval and Velocity

*NOTE: The following instructions assume that you do the following:*

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the M-Mode part of the display.
3. Press **Freeze**.

### Tissue depth

Tissue depth measurement in M-Mode functions the same as distance measurement in B-Mode. It measures the vertical distance between calipers.

1. Press **Measure** once; an active caliper with a vertical and horizontal dotted line displays.
2. To position the active caliper at the most anterior point you want to measure, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the most posterior point you want to measure, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the vertical distance between the two points in the Results Window.

### Time interval

To measure a horizontal time interval and velocity:

1. Press **Measure**. Press the top Trackball key to select Time; an active caliper with vertical and horizontal dotted lines displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

### Slope (Time interval and Velocity)

To measure time and velocity between two points:

1. Press **Measure**. Press the top Trackball key to select Slope; an active caliper with vertical and horizontal dotted lines displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays time(s) and slope between the two points in the Results Window.

## Viewing and Editing Worksheets

*NOTE: Worksheets are not saved if the system crashes.*

As you complete measurements, the system puts measurement data in the appropriate worksheets.

### To view a worksheet

To view a worksheet, select ***Worksheet*** on the touch panel.

OR

Select ***Worksheet*** on the measurement summary window.

The system displays the worksheet for the current study.

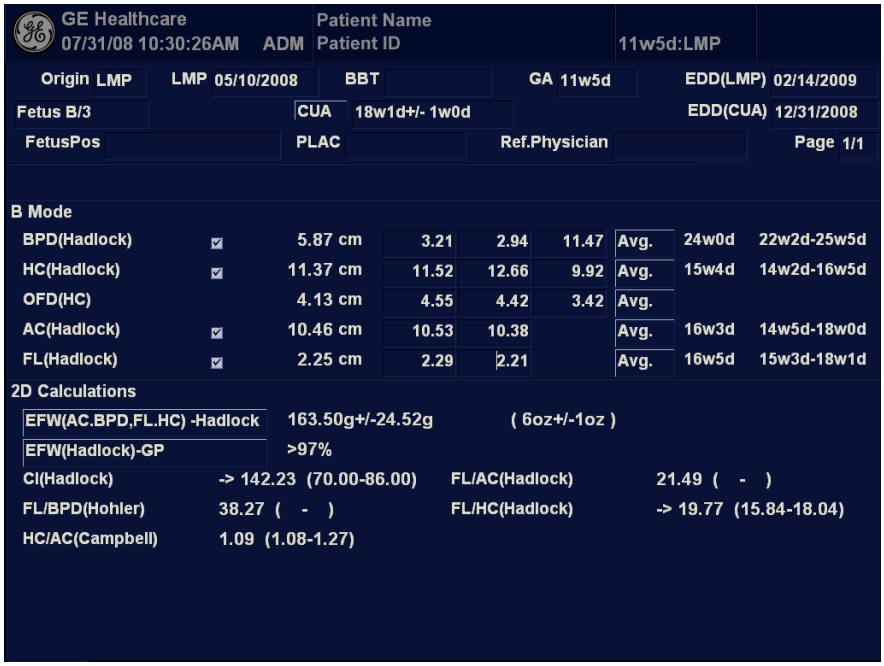



Figure 7-34. OB B-Mode Worksheet

To return to scanning, do one of the following:

- Select ***Worksheet***.
- Press ***Esc***.
- Select the *Exit* button.

## To view a worksheet (continued)

To view a different worksheet, select the worksheet key for the desired worksheet.

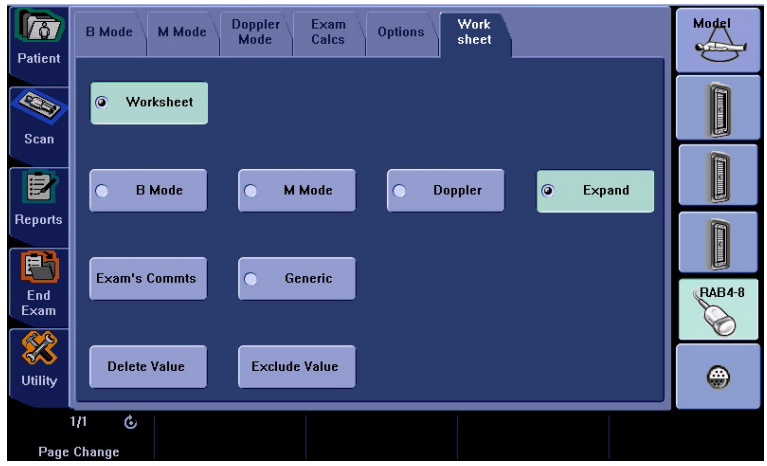



Figure 7-35. Worksheet Display touch panel

To view worksheet data for a particular mode, select the key for that mode. To view a worksheet with data for more than one mode, select ***Expand***. When Expand is selected, it defaults to view all measurements, noted by mode, on the worksheet.

If a worksheet has more data on a second page, to view the next page, adjust the **Page Change** control.

### To edit a worksheet

To change data on a worksheet:

1. To position the cursor at the field you want to change, move the **Trackball**. The field is highlighted.
2. Press **Set**.
3. Type the new data in the field. The new data is displayed in blue to indicate that it was manually entered.

To delete or exclude data on a worksheet:

1. To position the cursor at the field you want to delete or exclude, move the **Trackball**. The field is highlighted.
2. Do one of the following:
   - To delete the field, select ***Delete Value***.
   - To exclude the field, select ***Exclude Value***.

     The data in the field is not visible and is not included in worksheet calculations.
   - To include a value that you previously excluded, select ***Exclude Value***.

To type a comment on a worksheet:

1. Select ***Examiner's Comments***. The Examiner's Comments window opens.
2. Type comments about the exam.
3. To close the Examiner's Comments window, select ***Examiner's Comments***.

**To edit a worksheet (continued)**

To turn the volume measurement value off:

- Select the method type ***Off***. The value field becomes blank.

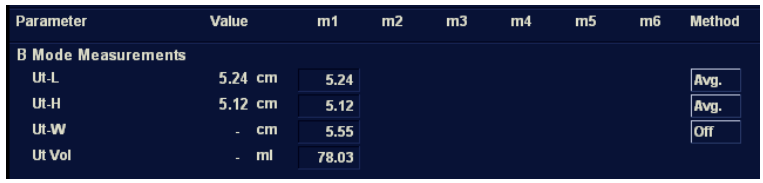



Figure 7-36. Volume Parameter Off

HINTS

Some fields on the worksheet are view only, and others you can change or select. To easily see which fields you can change or select, move the **Trackball**. As the cursor moves over a field that you can change or select, the field is highlighted.

### Delete All Worksheet Values

You can delete all worksheet values on a worksheet.

1. When the Worksheet is displayed on the monitor, press the **Clear** key; the following warning message appears:

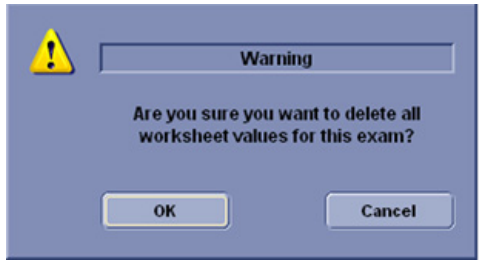



Figure 7-37. Delete All Warning Message

2. Select ***OK*** to delete all.

   Select ***Cancel*** to cancel the deletion.

# Generic Measurements

## Overview

Each exam category has a Generic study. The Generic studies provide you quick access to measurements such as volume, angle, A/B ratio, and % stenosis. The particular measurements available in each Generic study vary, depending on the exam category and the mode. This section describes generic measurements, organized by mode.

To access Generic studies:

1. On the Control Panel, press **Measure**.
2. On the touch panel, select ***Exam Calcs***.
3. On the touch panel, select the ***Generic*** folder.

Calculation formulas are available in the *Advanced Reference Manual*.

### Assign a name to the generic measurement

*NOTE: Available for any linear and circumference measurement.*

1. Move the cursor over the measurement result window and press **Set**.
2. Select ***Users...*** from the menu. The dialogue window displays.

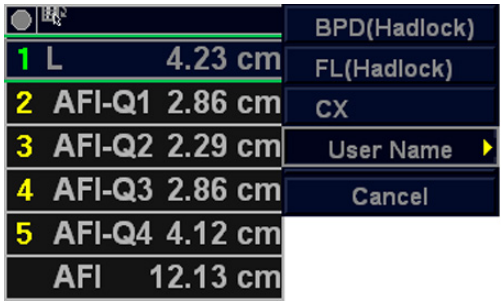



Figure 7-38. Users...

3. Enter the appropriate name and select OK.

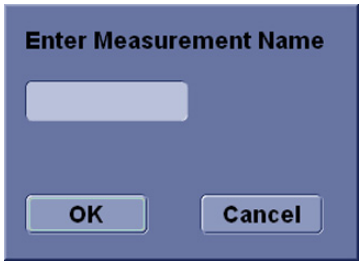



Figure 7-39. Enter new parameter

## Copy, move and paste measurement tools

You can copy, move and paste the measurement graphic.

*NOTE: This function is supported with trace, area trace, spline trace, volume trace, ellipse, 3-point ellipse, circle and intensity. The Double tools and Dual tools are not supported.*

### Copy and Paste

1. Measure the trace.
2. If present, clear the active caliper using the **Clear** key. Press the **Arrow** key to display the green arrow cursor on the screen. Move the cursor to the + mark of the measurement graphic. The selected graphic color changes from yellow to green.
3. Press **Set**. The pop-up menu displays. Select ***Copy***.

Figure 7-40. Copy and Move Menu

4. Press **Set** on the outer side of the measurement graphic. The pop-up menu displays.
5. Select ***Paste***. The copied graphic displays on top of the original graphic in green. Move it to the desired position using the **Trackball** and press **Set** to fix the location.

*NOTE: If the copied graphic is bigger than the pasted area, "Paste" fails and "The copied graphic cannot be pasted to this area" message displays on the status bar.*

**Copy and Move**

1. Measure the trace.
2. If present, clear the active caliper using the **Clear** key. Press the left **Set** key to display the green arrow cursor on the screen. Move the cursor to the + mark of the measurement graphic. The selected graphic color changes from yellow to green.
3. Press **Set**. The popup menu displays. Select ***Copy&Move***.
4. The copied graphic displays on top of the original graphic in green. Move it to the desired position using the **Trackball** and press **Set** to fix the location.

**Move**

1. Measure the trace.
2. If present, clear the active caliper using the **Clear** key. Press the left **Set** key to display the green arrow cursor on the screen. Move the cursor to the + mark of the measurement graphic. The selected graphic color changes from yellow to green.
3. Press **Set**. The pop-up menu displays. Select ***Move***.
4. Move the selected graphic to the desired position using the **Trackball** and press **Set** to fix the location.

## B-Mode Measurements

In B-Mode, the Generic study includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio

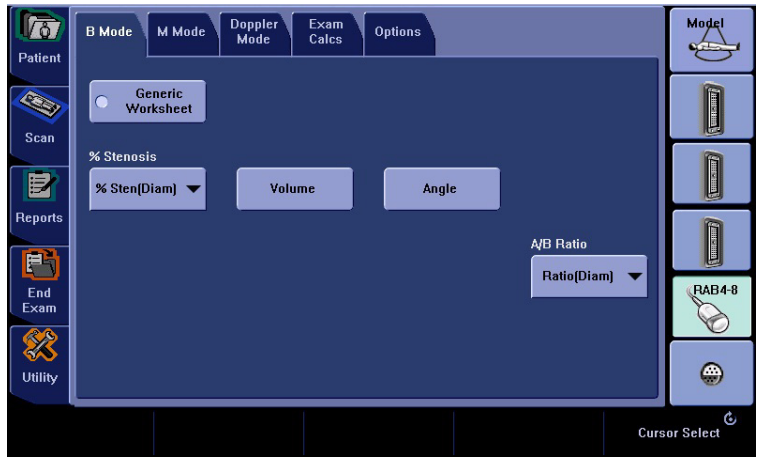



Figure 7-41. B-Mode Generic Study

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

## % Stenosis

You can calculate % Stenosis by diameter or by area, depending on the mode.

*NOTE: The LOGIQ S7 Expert/Pro automatically activates the % Stenosis with the default selection. If another method is preferred, select it from the touch panel.*

### Diameter

*NOTE: When you use diameter to calculate the %stenosis, always take the measurement from a cross-sectional view of the vessel.*

To calculate percent stenosis by diameter:

1. From the Generic touch panel, select ***% Stenosis***.
2. Select ***%sten(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the inner area of the blood vessel.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the outer area of the blood vessel.

   The system displays each distance measurement and the % Stenosis in the Results Window.

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-58 for more information.*.

*NOTE: For the diameter calculation, do NOT take a distance measurement from a longitudinal view. This may lead to an inaccurate assessment of % stenosis.*

## % Stenosis (continued)

### Area

To calculate percent stenosis by area:

1. From the Generic touch panel, select ***% Stenosis***.
2. Select ***%sten(Area)***.

   The system displays a caliper.
3. Make a trace measurement of the inner area of the blood vessel.

*NOTE: To erase an open trace, move the **Trackball**.*

4. Press **Set**.

   The system displays a second caliper.
5. Make a trace measurement of the outer area of the blood vessel.

   The system displays the two area measurements and percent stenosis in the Results Window.

See ‘Circumference and area (trace) measurement’ on *page 7-60 for more information.*

### Ellipse + Area

To calculate percent stenosis by ellipse and area:

1. From the Generic touch panel, select ***% Sten[E+A]*** folder.
2. Ellipse is selected by default.

   The system displays a caliper.

*NOTE: You can select the trace at this time.*

3. Make an ellipse measurement of the inner area of the blood vessel.
4. Press **Set**.

   The system displays a caliper.
5. Make a trace measurement of the outer area of the blood vessel.

   The system displays the two area measurements and percent stenosis in the Results Window.

*NOTE: % Stenosis (E+A) is not available through the factory default. To enable %Stenosis (E+A), add “%Steno(E+A)” to the Measure & Study list on the Utility -> Measure -> M&A screen.*

## Volume

The volume calculation can be made from any of the following measurements:

- One distance
- Two distances
- Three distances
- One ellipse
- One distance and one ellipse

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-58 for more information.*

For details on how to make an ellipse measurement, See ‘Circumference and area (ellipse) measurement’ on *page 7-59 for more information.*

*NOTE: IMPORTANT!! If you want to make a volume calculation using one or two distances, you must select* ***Volume*** *BEFORE you make the measurements.*

*NOTE: If you select Fix Caliper by Print Key on the Utility --> System --> System Measure, the print key does not function like the Set key, but instead ends the measurement sequence and initiates the volume calculation based on the number of measurements taken so far.*

To make a volume calculation using one or two distances:

1. Select ***Volume***.
2. Make one or two distance measurements.
3. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

*NOTE: Use the* ***Clear*** *key to erase the green caliper.*

## Volume (continued)

To make a volume calculation using three distances:

1. Make three distance measurements.

*NOTE: Three distances can be done in the dual format mode (side by side images). One measurement is usually made in the sagittal plane and two measurements in the axial plane. To use the dual format mode, press the **L** or **R** key on front panel.*

2. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

To make a volume calculation using one ellipse:

1. Make one ellipse measurement.
2. Select ***Volume***.

   The system displays the ellipse measurement and the volume in the Results Window.

## Volume (continued)

To make a volume calculation using one ellipse and one distance:

1. Make one distance measurement and one ellipse measurement.
2. Select ***Volume***.

   The system displays the distance and ellipse measurement and the volume in the Results Window.

HINTS

- Volumes are most accurate when measurements are taken in the sagittal and axial scan planes.
- To display sagittal and axial plane images simultaneously, use the side-by-side dual format option.

*NOTE: If you change the parameters or category during the volume measurement, please follow the procedure below before you restart the measurement.*

1. *Check the number of each measurement in the summary window.*
2. *If the numbers are not all the same, it shows that you have the calculation which is not completed. Open the Worksheet and clear that calculation.*

## Volume (continued)

Table 7-3: Volume Calculations

| Calc Name | Input Measurements |
|---|---|
| Volume (spherical) | One distance |
| Volume (prolate spheroidal) | Two distances, d1>d2 |
| Volume (spheroidal) | Three distances |
| Volume (prolate spheroidal) | One ellipse: (d1 major axis, d2 minor axis) |
| Volume (spheroidal) | One distance d1, and one ellipse (d2 major axis, d3 minor axis) |

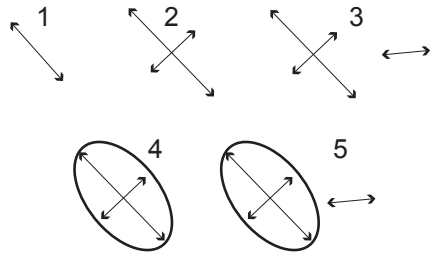



Figure 7-42. Volume Calculation Examples

1. One distance
2. Two distances
3. Three distances
4. One ellipse
5. One distance and one ellipse

Calculation formulas are available in the *Advanced Reference Manual*.

## Volume (continued)

### Post-assignment for General Volume

You can input a unique name for the general volume measurement. You can group the general volume measurements for each application.

1. Complete the volume measurement.
2. Move the caliper to the measurement result box (with green frame) and select **Set**.
3. The volume name menu appears. Select Name Volume.

Figure 7-43. Volume Name menu

4. The dialog box displays. Enter a new name or choose the existing name.

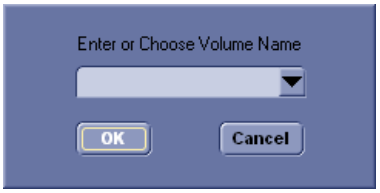



Figure 7-44. Volume Name Dialog box

*NOTE: The factory default volume name cannot be changed (for example, Renal Volume).*

## Angle

This function measures the angle between two intersecting planes.

1. From the Generic touch panel, select ***Angle***.
   The system displays an active caliper.
2. To position the caliper, move the **Trackball**.
3. To fix the position of the first caliper, press ***Set***.
   The system displays a second active caliper.
4. To position the second caliper at the apex of the angle, move the **Trackball**.
5. To fix the position of the second caliper, press **Set**.
   The system displays a third active caliper.
6. To position the third caliper, move the **Trackball**.
7. To complete the angle measurement, press **Set**.
   The system displays the angle in the Results Window.

*NOTE: To rotate through and activate previously fixed calipers, adjust the **Cursor Select** control.*

## A/B Ratio

In B-Mode, you can calculate A/B ratio by diameter or by area.

*NOTE: The LOGIQ S7 Expert/Pro automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the touch panel.*

### Diameter

To calculate A/B ratio by diameter:

1. From the Generic touch panel, select ***A/B Ratio***.
2. Select ***ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first diameter.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the second diameter.

   The system displays each distance measurement and the A/B ratio in the Results Window.

*NOTE: The first distance is the A diameter. The second distance is the B diameter.*

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-58 for more information.*

### Area

To calculate A/B ratio by area:

1. From the Generic touch panel, select ***A/B Ratio***.
2. Select ***ratio(Area)***.

   The system displays a caliper.
3. Make a trace measurement of the A area.

*NOTE: To erase an open trace, move the **Trackball**.*

   The system displays a second caliper.
4. Make a trace measurement of the B area.

   The system displays the two area measurements and the A/B ratio in the Results Window.

For details on how to make a trace measurement, See ‘Circumference and area (trace) measurement’ on *page 7-60 for more information.*

## M-Mode Measurements

In M-Mode, the Generic study includes the following measurements:

- % Stenosis
- A/B Ratio
- HR (Heart Rate)

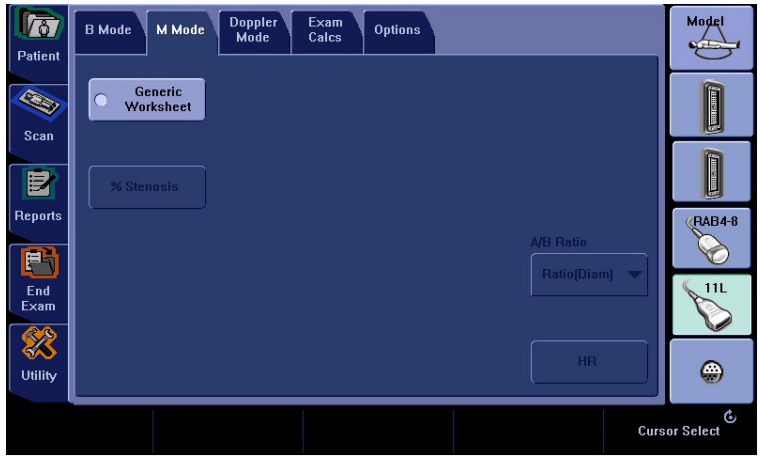



Figure 7-45. M-Mode Generic Study

### % Stenosis

See '% Stenosis' on *page 7-87 for more information.*

## A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity.

*NOTE: The LOGIQ S7 Expert/Pro automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the touch panel.*

### Diameter

See 'Diameter' on *page 7-95 for more information.*

### Time

To calculate A/B ratio by time:

1. Select ***A/B***.
2. Select ***ratio(Time)***.

   The system displays an active caliper.
3. To position the caliper at the A point, move the **Trackball**.
4. To fix the measure point, press **Set**.

   The system displays a second active caliper.
5. To position the second caliper at the B point, move the **Trackball**.
6. To complete the measurement, press **Set**.

   The system displays the two time measurements and A/B ratio in the Results Window.

### Velocity

To calculate AB ratio by velocity:

1. Select ***A/B***.
2. Select ***ratio(Velocity)***.

   The system displays an active caliper with vertical and horizontal dotted lines.
3. To position the caliper at the A velocity, move the **Trackball**.
4. To fix the measure point, press **Set**.

   The system displays a second active caliper.
5. To position the second caliper at the B velocity, move the **Trackball**.
6. To complete the measurement, press **Set**.

   The system displays the two velocity measurements and the A/B ratio in the Results Window.

## Heart Rate

To calculate the heart rate from M-Mode:

1. Obtain an image and press Measure. Select ***HR***.

   The system displays an active caliper.
2. To position the caliper at a recognizable point in the first cycle, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the identical point in the next cycle (depending on preset), you need to move the **Trackball**.

*NOTE: In the message bar at the bottom of the display, the system indicates the number of cycles you should measure.*

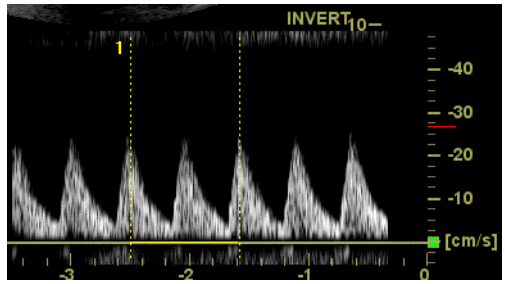



Figure 7-46. Two Heart Beat Reference (example in Doppler mode)

5. To complete the measurement and transfer the calculation to the worksheet, press **Set**.

*NOTE: For information about how to specify the number of heart beats that the system will use, See 'Specifying measurement and display options' on page 7-9 for more information.*

## Doppler Mode Measurements

In Doppler Mode, the Generic study includes the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- PS/ED Ratio or ED/PS Ratio
- A/B Ratio
- FV-D (Mean)/FV-D (Max)
- HR (Heart Rate)

Figure 7-47. Doppler Mode Generic Study

*NOTE: The following instructions assume that you do the following:*

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

## Control Assignment

### Cancel Transfer

*NOTE: Only for Vascular, Abdomen, OB and GYN.*

Figure 7-48. Cancel Transfer

After the Auto Vascular calculation results are assigned to a particular vessel, the user can cancel the assignment and assigned parameters are removed from Worksheet and Report page.

When Cancel Transfer occurs, a message appears on the screen to indicate the value was erased from Worksheet and Report page.

## Control Assignment (continued)

### Vessel location

If the vessel has a location, you can select one of the following:

- Proximal (***Prox***)
- Middle (***Mid***)
- Distal (***Dist***)

*NOTE: If you do not wish to assign a vessel location, press the lit location, then no location is assigned. Choose the folder you want the value assigned to.*

To select one of the locations, adjust the touch panel control.

### Side Rt/Lt

The system has measurements for the patient's right and left side. To select right or left, adjust the touch panel knob.

## Pulsatility Index (PI)

For auto trace:

1. Select ***PI***.

   The system displays a caliper and a vertical dotted line.
2. Position the caliper at the beginning of the waveform.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. Position the caliper at the end of the waveform.
5. To complete the measurement, press **Set**.

   The system displays peak systole, minimum diastole, end diastole, TAMAX, and PI in the Results Window.

For manual trace:

1. Select ***PI***.

   The system displays a caliper and a vertical dotted line.
2. Position the caliper at the beginning of the waveform.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. Manually trace the entire waveform.
5. To complete the measurement, press **Set**.

   The system displays peak systole, minimum diastole, end diastole, TAMAX, and PI in the Results Window.

### Resistive Index (RI)

1. From the Doppler Generic touch panel, select ***RI***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the peak systolic velocity, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at the end diastolic velocity, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays PS, ED, and RI in the Results Window.

## PS/ED or ED/PS Ratio

To calculate the Peak Systole/End Diastole ratio or End Diastole/Peak Systole ratio:

1. Select ***PS/ED*** or ***ED/PS***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole (PS) or end diastole (ED), move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole (ED) or peak systole (PS), move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, and PS/ED or ED/PS ratio in the Results Window.

## A/B Ratio

In Doppler Mode you can measure A/B ratio by velocity, time, or acceleration.

*NOTE: The LOGIQ S7 Expert/Pro automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the touch panel.*

### Velocity

See ‘Velocity’ on *page 7-97 for more information.*

### Time

See ‘Time’ on *page 7-97 for more information.*

### Acceleration

To measure A/B ratio by acceleration:

1. Select ***A/B***.
2. Select ***ratio(Acc)***.

   The system displays an active caliper.
3. Make a distance measurement of the A acceleration point.
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper for the second distance measurement.
4. To make a distance measurement of the B acceleration point, repeat steps a–d.

   The system displays the two acceleration measurements and the A/B ratio in the Results Window.

## Heart Rate

To measure heart rate, See ‘Heart Rate’ on *page 7-98 for more information.* or select any of the following measurements.

### Acceleration

1. Select ***Accel***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, acceleration time, and acceleration in the Results Window.

### Acceleration Time (AT)

1. Select ***AT***.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the acceleration time in the Results Window.

### Peak Systole (PS), End Diastole (ED), or Minimum Diastole (MD)

To calculate the peak systole, end diastole, or minimum diastole:

1. Select ***PS***, ***ED***, or ***MD***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, or minimum diastole in the Results Window.

## Modify Auto Calcs

When you select this key, the Modify Calculation menu is displayed as below. In this menu, you select parameters to display in the Auto Vascular Calculation window. Only parameters that can be used by the calculation are displayed.

Select ***Save as Default*** to save the selected parameters as the default calculations for this application.

Select ***Return*** to return to the previous touch panel screen.

If you select ***PV***, all selected parameters are turned off. When you deselect ***PV***, the system returns to the previously selected calculation.

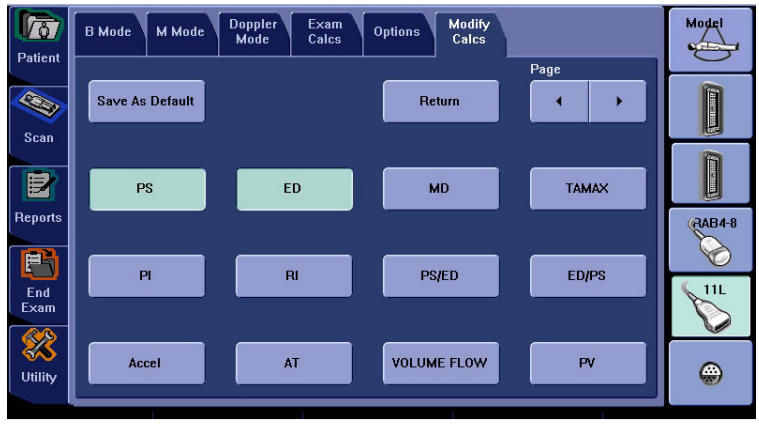



Figure 7-49. Modify Auto Calculation Menu (Page1)

## Auto vs. Manual Calculations

The same calculations can be performed using either manual or auto calcs.

### Manual Calcs

To perform manual calcs:

1. To turn Auto Calcs off and perform manual measurements, choose ***Auto Calcs -> OFF*** on the PW tab of the touch panel.
2. After obtaining a waveform, press **Measure**. Choose the appropriate vessel folder or calculation. The system walks you through the measurement.

*NOTE: To program which calculations are done under manual calcs when using measurement folders for measuring specific vessels, press the Utility key. Select Measure -> Doppler and program your manual calcs (Auto Calcs OFF). Each vessel must be programmed individually and saved after each change.*

## Auto Calcs

To perform auto calcs:

1. Ensure that the auto calcs function is on by choosing ***Auto Calcs -> Frozen*** or ***Live*** on the PW tab of the touch panel.
   - Live: Auto calculation activates when the system is in real-time.
   - Freeze: Auto calculation activates when you press Freeze.
   - Off
2. After obtaining a waveform, press **Measure**. Choose the appropriate vessel folder, side and location. The measurements that are pre-programmed are performed automatically and entered in the worksheet.

To modify auto calcs:

1. Select ***Modify Auto Calcs*** on the touch panel.
2. Choose the measurements to be performed with this preset.
3. To save these measurements:
   - If this is a temporary change, press ***Return***.
   - If this is a permanent change, select ***Save as default***.

   The measurements are saved and can be performed with the auto calcs function.

### Edit Auto Calcs

Auto Calcs can be edited after taking an Auto Trace measurement.

1. After taking an Auto Calc with a trace, select the measurement result on the result window. The Edit Trace menu window appears.

*NOTE: If the system cannot take the trace data correctly from the image, Edit Trace does not work.*

2. Select Edit Trace. The first caliper (manual trace caliper) appears on the center of the image. Use the **Trackball** to move the caliper on the trace line to the start point.

*NOTE: To cancel Edit Trace at this time, press **Clear**, **Scan**, or **Freeze**.*

3. Press **Set** to fix the first caliper. The second caliper appears. Edit the trace manually using the second caliper.

   The Ellipse control is used to edit the trace.

*NOTE: When pressing the **Clear** key once at this time, the second caliper disappears and the first caliper appears in the center of the image.*

*NOTE: If you press **Scan** or **Freeze** at this time, the caliper is automatically fixed and the result window updates.*

4. Press **Set** to fix the second caliper. The trace and the result window are updated. The data is retaken from the trace and updated.

*NOTE: While in Edit Trace, Cursor Select is disabled.*

   The trace data (TAMAX and TAMEAN) is updated, but the other selections (e.g. PS, ED) are not updated by trace. The points can be edited using ***Cursor Select*** if needed.

5. Repeat Edit Trace as needed.

## Performing Measurements on Saved Images

You can perform measurements on recalled images. Select the image, then perform the measurement. If the image was not saved as a raw DICOM image, you need to calibrate the image prior to performing the measurement.

To calibrate the image,

1. Recall the image.
2. Press **Measure**. The Measurement Calibration touch panel appears.

Figure 7-50. Meas. Calib touch panel

3. Select the mode you need to be in to perform the measurement.
4. Press the appropriate mode key on the touch panel (***2D calib*** for B-Mode, ***MM calib*** for M-Mode, or ***Dop. calib*** for Doppler mode). The specified mode calibration pop-up appears.

## Performing Measurements on Saved Images (continued)

5. The system prompts you, depending on the mode.

   B-Mode:

   a. Place the first point of the caliper on the ruler. Press **Set**.

   b. Position the cursor at the 5 cm point on the ruler. Press **Set**.

   c. Type “5” into the 2D-Mode Calibration pop-up window. Press OK.

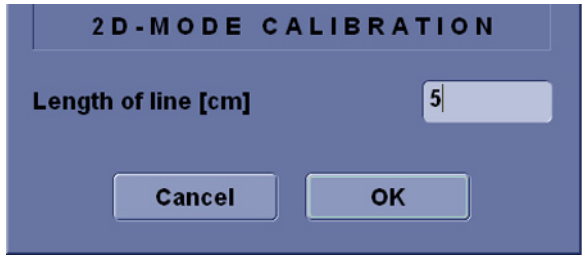



Figure 7-51. 2D-Mode Calibration

## Performing Measurements on Saved Images (continued)

M-Mode or Doppler Mode:

a. Place the cross on zero depth and minimum or zero time.

b. Place the cross on maximum depth and time.

c. Type the time (in seconds) and velocity (cm/sec) in the M-Mode/Doppler Mode calibration pop-up window.

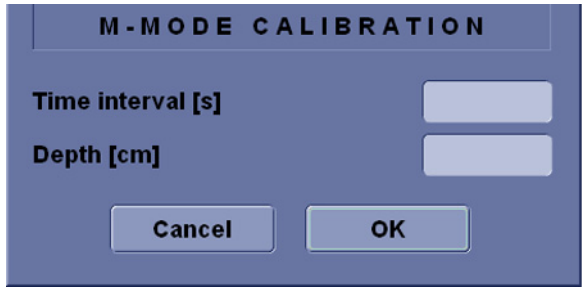



Figure 7-52. M-Mode Calibration

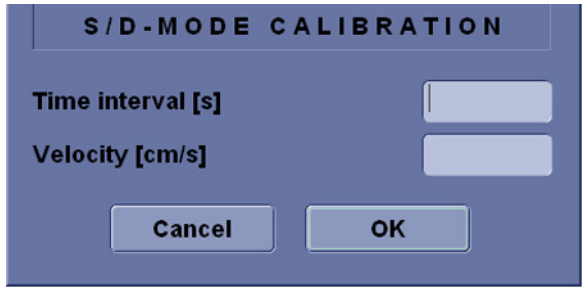



Figure 7-53. Doppler Mode Calibration

## Helpful hints

HINTS

The following hints can help when making a measurement

- Prior to making measurements, use the Cine function, if necessary, to display the best image.
- As you take measurements, each measurement is given a sequential number on the display and in the Results Window. Nine measurements can be displayed in the Results Window at one time.
- Once the Results Window has nine measurements, if you make any further measurements, the system erases the top (first) measurement and adds the new measurement last ("first in, first out").
- While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

# *Chapter 8*

# Abdomen and Small Parts

*Describes how to perform Abdomen and Small Parts measurements and calculations.*

# Abdomen/Small Parts Exam Preparation

## Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Calculation formulas are available in the *Advanced Reference Manual*.

## General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the touch panel.

# Abdomen

## Overview

Abdominal measurements offer a few different types of measurement studies:

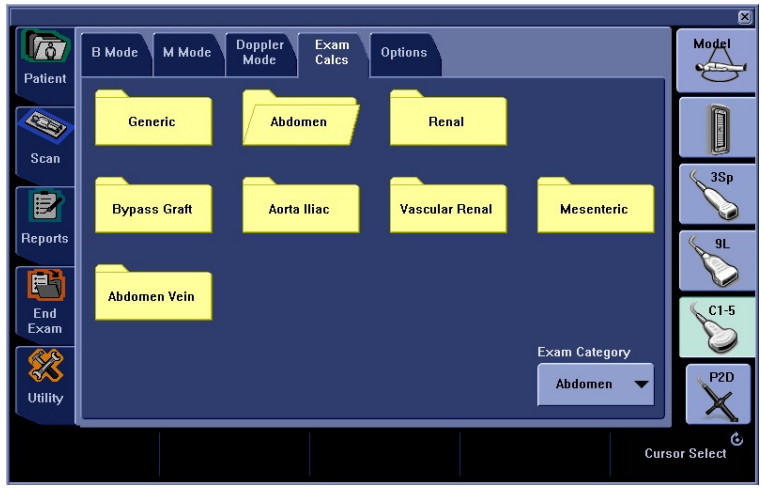



Figure 8-1. Abdomen Exam Category touch panel

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-82 for more information.*
- Abdomen
- Renal
- Bypass Graft
- Aorta Iliac
- Vascular Renal
- Mesenteric
- Abdomen Vein

## Overview (continued)

1. Press **Measure**.
2. Select the touch panel key.
3. Press ***Exam Calcs***.

   The Abdomen exam category allows you to choose from the displayed studies.
4. To choose another study, select that desired study.

# Small Parts

## B-Mode Measurements

The Small Parts exam category includes the following two folders:

- Generic - Common to all applications. See ‘Generic Measurements’ on *page 7-82 for more information.*
- Small Parts, which includes the thyroid and scrotal measurements described in this section.

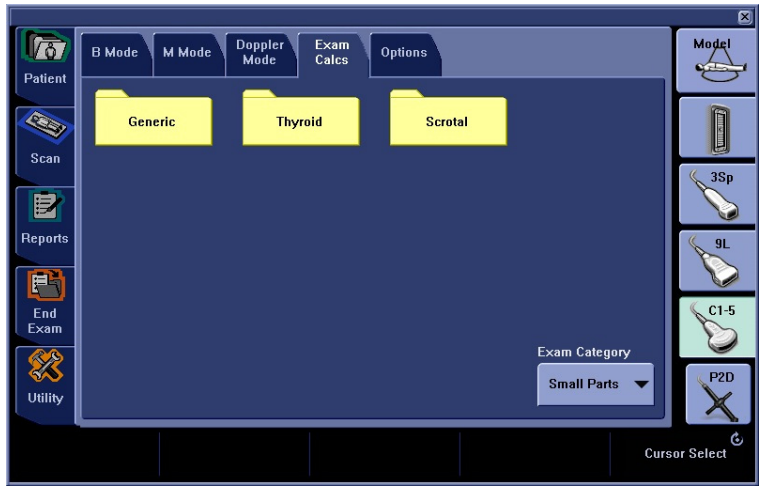



Figure 8-2. Small Parts Exam Category touch panel

## Thyroid

### Thyroid Left/Right

Each of these is a standard distance measurement. Length and height are typically measured in the sagittal plane. Width is measured in the transverse/axial plane.

To measure thyroid length, width, or height:

1. On the ***Exam Calcs***, select ***Small Parts***.
2. Select ***Thyroid***.
3. Select ***Lt or Rt Thyroid***. Change the orientation (side), if necessary.
4. Select ***Thyroid L***, ***Thyroid W***, or ***Thyroid H***.

   An active caliper displays.
5. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
6. The system automatically prompts to make the second and third distance measurements.

   After you complete the third distance measurement, the system displays the thyroid volume in the Results Window.

### Isthmus AP

To measure the anterior/posterior isthmus tissue, perform a distance measurement.

## Scrotal

### Scrotal Left/Right

Each of these is a standard distance measurement. Length and height are typically measured in the sagittal plane. Width is measured in the transverse/axial plane.

To measure scrotal length, width, or height:

1. On the ***Exam Calcs***, select ***Small Parts***.
2. Select ***Scrotal***.
3. Select ***Lt or Rt Testicle***. Change the orientation (side), if necessary.
4. Select ***Testicle L***, ***Testicle W***, or ***Testicle H***.

   An active caliper displays.
5. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
6. The system automatically prompts to make the second and third distance measurements.

   After you complete the third distance measurement, the system displays the scrotal volume in the Results Window.

### Epididymis

To measure the epididymis structure, perform a distance measurement.

# *Chapter 9*

# OB/GYN

*Describes how to perform obstetric and gynecology measurements and calculations, and how to use OB graphs and worksheets.*

# OB Exam

## Exam Preparation

Prior to an ultrasound examination, the patient should be informed of the clinical indication, specific benefits, potential risks, and alternatives, if any. In addition, if the patient requests information about the exposure time and intensity, it should be provided. Patient access to educational materials regarding ultrasound is strongly encouraged to supplement the information communicated directly to the patient. Furthermore, these examinations should be conducted in a manner and take place in a setting which assures patient dignity and privacy.

- Prior material knowledge and approval of the presence of nonessential personnel with the number of such personnel kept to a minimum.
- An intent to share with the parents per the physician’s judgement, either during the examination or shortly thereafter, the information derived.
- An offer of choice about viewing the fetus.
- An offer of choice about learning the sex of the fetus, if such information becomes available.

Ultrasound examinations performed solely to satisfy the family's desire to know the fetal sex, to view the fetus, or to obtain a picture of the fetus should be discouraged.

## Acoustic Output Considerations

### General warning

The LOGIQ S7 Expert/Pro system is a multi-use device which is capable of exceeding FDA Pre-enactment acoustic output (spatial peak-temporal average) intensity limits for fetal applications.

It is prudent to conduct an exam with the minimum amount and duration of acoustic output necessary to optimize the image's diagnostic value.

### Concerns surrounding fetal exposure

Always be aware of the acoustic output level by observing the Acoustic Output Display. In addition, become thoroughly familiar with the Acoustic Output Display and equipment controls affecting output.

### Training

It is recommended that all users receive proper training in fetal Doppler applications before performing them in a clinical setting. Please contact a local sales representative for training assistance.

## To Start an Obstetrics Exam

*NOTE: Calculation formulas are listed in the Advanced Reference Manual.*

To begin an Obstetrics exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

1. Press ***Patient***.

   The Patient Data Entry screen is displayed.
2. On the Patient Data Entry screen, select New Patient.
3. To choose an Obstetrics exam, move the ***Trackball*** to highlight Obstetrics, then press ***Set***.

   The obstetric fields are listed in the Exam Information section of the Patient Data Entry screen.
4. Do one of the following:

   - If the patient data is already stored in the system, search for the data. Use the search fields in the bottom section of the Patient Data Entry screen. For information about how to search for patient data, see ‘Changing Patient Information or an Exam’ on *page 4-25* for more information.

     When the correct patient data is listed in the search list, move the ***Trackball*** to highlight the patient name and press ***Set***. The system displays the patient data.

     *NOTE: To change patient data, use the **Trackball** to move the cursor to the field and press **Set**. Press **Backspace** to delete the data, and then type the correct data.*
   - If the patient data is not stored in the system, enter the data. To enter data in a field, move the ***Trackball*** to highlight the field and then press ***Set***. Use the ***Tab*** key to move between fields. Obstetric patient fields are listed in the following table.

     *NOTE: For information about entering general patient data such as Patient ID and name, see ‘Beginning a New Patient’ on page 4-3 for more information.*

## To Start an Obstetrics Exam (continued)

Table 9-1: Obstetric fields

| Field | Description |
|---|---|
| LMP | Last Menstrual Period; enter the date that the patient started her last menstrual period.<br>You must enter 4 digits for the year. When you type the month and day, the system fills in the /. The Date Format preset chosen in Utilty -> System -> General determines the required format. |
| BBT | Basal Body Temperature. |
| EDD by LMP | Estimated Delivery Date by LMP; the system fills in the date after you enter the LMP. |
| GA by LMP | Gestational Age by LMP; the system fills in the age after you enter the LMP. |
| Gravida | Number of pregnancies. |
| Para | Number of births. |
| AB | Number of abortions. |
| Ectopic | Number of ectopic pregnancies. |
| Fetus # | Number of fetuses; default is 1. Can be 1-4. |
| Accession # | Exam number used with hospital information system (DICOM). This is a tracking number from the worklist. |
| Exam Description | Describe the type of exam. |
| Perf Physician | The physician who performs the exam. Choose from the list or type the name. |
| Ref. Physician | The physician who requested the exam. Choose from the list or type the name. |
| Operator | The person (not a physician) who performs the scan. Choose from the list. |

*NOTE: To fill in the following information, move the **Trackball** to highlight the Detail button and press **Set**.*

## To Start an Obstetrics Exam (continued)

Table 9-2: Obstetric fields: Detail

| Field | Description |
|---|---|
| Indications | Why the patient needs the ultrasound exam. |
| Comments | Comments about the exam. |

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
   - On the keyboard, press ***Esc***.
   - On the touch panel, select ***Scan***.
   - On the Control Panel, select **Freeze**.
   - On the Control Panel, press the **B-Mode** key.

   The system displays the Scan screen.
2. To choose the appropriate probe, select the probe icon on the touch panel.
3. On the Control Panel, press ***Measure***.

   The default Obstetrics study is displayed on the touch panel.

## OB Type change

The LOGIQ S7 Expert/Pro system includes measurements for the following studies: USA, Europe, Tokyo, Osaka and ASUM.

Select OB Type in Utility -> System -> System Measure. See ‘System/System Measure Preset Menu’ on *page 16-24 for more information.*

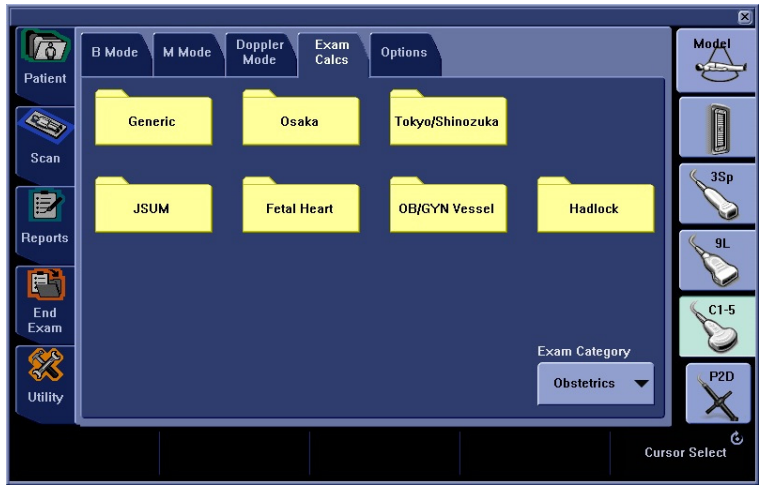



Figure 9-1. OB Type: Tokyo

*NOTE: ASUM studies include the following measurements:*

- ASUM: AC, BPD, and CRL
- ASUM 2001: AC, BPD, CRL, FL, HC, HL, and OFD

# OB Measurements and Calculations

## Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

## Introduction (continued)

When you make measurements, you can select the calculation before you make the measurement or after you make it. If you select the calculation before you make the measurement, the Results Window shows the estimated fetal age as you make the measurement. If you select the calculation after you make the measurement, the estimated fetal age is displayed after you complete the measurement. The measurements steps in this section tell you to select the calculation before you make the measurement.

The following pages describe how to make OB measurements and calculations. The measurements are organized by mode, and within mode are listed in alphabetical order.

Out of Range – If the system indicates that a measurement is out of range (OOR), it means one of the following:

- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement is outside of the range for the data used in the calculation. That means that the measurement is either less than or more than the range of measurements used to determine fetal age based on the measurement.

*NOTE: Calculation formulas are listed in the Advanced Reference Manual.*

## B-Mode Measurements

This section describes all B-Mode measurements that you typically find in OB studies. Additional OB measurements follow the typical ones.

### Abdominal Circumference (AC)

To calculate abdominal circumference, you make an ellipse, trace, spline trace or two distance measurements.

#### Ellipse

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***Ellipse*** from the pop-up menu on the touch panel.
3. To position the active caliper, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second caliper, move the **Trackball**.
6. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, press the top **Trackball** key.
7. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

## Abdominal Circumference (AC) (continued)

### Trace

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***Trace*** from the pop-up menu on the touch panel.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the dotted line but not the caliper, press **Clear** once.
- To clear the caliper and the current data measured, press **Clear** twice.

## Abdominal Circumference (AC) (continued)

### Spline Trace

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***Spline*** from the pop-up menu on the touch panel.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

*NOTE: The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).*

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

## Abdominal Circumference (AC) (continued)

### Two distances

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***Caliper*** from the pop-up menu on the touch panel.
3. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.

HINTS

- Before you complete a measurement (press **Set**):
  - To toggle between active calipers, press the top **Trackball** key.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

## Biparietal Diameter

To measure biparietal diameter, make one distance measurement:

1. Select ***BPD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the biparietal diameter in the Results Window.

## Crown Rump Length

To measure crown rump length, make one distance measurement:

1. Select ***CRL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the crown rump length in the Results Window.

## Femur Length

To measure femur length, make one distance measurement:

1. Select ***FL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the femur length in the Results Window.

## Gestational Sac

To calculate the gestational sac, you make three distance measurements in two scan planes. To display two scan planes, press the **L** or **R** key. Get an image in each scan plane and press **Freeze**.

1. Select ***GS***; an active caliper displays.
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
2. To make the second and third distance measurement, repeat steps a–d.

   After you complete the third distance measurement, the system displays the gestational sac measurement in the Results Window.

## Gestational Sac (continued)

To calculate the gestational sac by a one distance measurement:

1. Select ***GS***; an active caliper displays.
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      After you complete the measurement, the system displays the gestational sac measurement in the Results Window.

## Head Circumference (HC)

To calculate head circumference, you make an ellipse, trace, spline trace or two distance measurements.

### Ellipse

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***Ellipse*** from the pop-up menu on the touch panel.
3. To position the active caliper, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second caliper, move the **Trackball**.
6. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, press the top **Trackball** key.
7. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

## Head Circumference (HC) (continued)

### Trace

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***Trace*** from the pop-up menu on the touch panel.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the dotted line but not the caliper, press **Clear** once.
- To clear the caliper and the current data measured, press **Clear** twice.

## Head Circumference (HC) (continued)

### Spline Trace

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***Spline*** from the pop-up menu on the touch panel.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

*NOTE: The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).*

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

## Head Circumference (HC) (continued)

### Two distances

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***Caliper*** from the pop-up menu on the touch panel.
3. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.

HINTS

- Before you complete a measurement:
  - To toggle between active calipers, press the top **Trackball** key.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

## Amniotic Fluid Index (AFI)

To calculate the amniotic fluid index, you make measurements of the four quadrants of the uterine cavity. The system adds these four measurements together to calculate the Amniotic Fluid Index.

*NOTE: The four quadrants can be measured with distance (caliper) or circumference (circle) measurements. Press the appropriate AFI quadrant touch panel key to show the pop-up menu to select caliper and circle.*

1. Select ***AFI***.

   The first distance measurement, AFI-Q1, is already selected.
2. Make a standard distance measurement for the first quadrant:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
3. When the measurement of the first quadrant is completed, unfreeze and move to the second quadrant.
4. After you obtain the image, press **Freeze** and then **Measure**.

   The system prompts you to continue with the AFI measurements. Make sure that the next quadrant has been selected.

## Amniotic Fluid Index (AFI) (continued)

5. Perform a standard distance measurement for the second, third, and fourth quadrants (see step 2).

   When all four quadrants have been measured, the system calculates the AFI total and displays it in the Results Window.

HINTS

- If you unfreeze the image after doing an AFI measurement, the system does not delete the previous measurements. Unfreeze and change scan planes as necessary.
- To specify that an unassigned distance measurement be used for an AFI measurement:
  - Select ***AFI***.
  - Press the top **Trackball** key.
  - Move the **Trackball** to highlight the unassigned distance measurement in the Results Window.
  - Select the AFI measurement on the touch panel.
- If the fluid in a pocket is zero, set the second caliper on top of the first one to give it a zero value.
- You can measure an AFI quadrant that is zero (0) by pressing **Set** twice.

## A/B Ratio

In B-Mode you can calculate A/B ratio by diameter or by area. See ‘A/B Ratio’ on *page 7-95 for more information.*

## Angle

See ‘Angle’ on *page 7-94 for more information.*

## Antero-Postero Trunk Diameter & Transverse Trunk Diameter (APTD-TTD)

Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***APTD_TTD***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter and the transverse trunk diameter in the Results Window.

### Antero-PosteroTrunk Diameter by Transverse Trunk Diameter (AxT)

Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***AxT***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter, the transverse trunk diameter, and AxT in the Results Window.

## Cardio-Thoracic Area Ratio (CTAR)

To calculate cardio-thoracic area ratio, you make two ellipse measurements.

1. Select ***CTAR***; an active caliper displays.
2. Make an ellipse measurement of the cardiac area:
   a. To position the active caliper, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second caliper, move the **Trackball**.
   d. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.

   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, press the top **Trackball** key.

   e. To complete the ellipse measurement, press **Set**.

      The system displays the cardiac area measurement in the Results Window
3. To make an ellipse measurement of the thoracic area, repeat steps a–e.

   The system displays the cardio-thoracic area ratio in the Results Window.

## Estimated Fetal Weight (EFW)

To measure estimated fetal weight, you make several OB measurements. These measurements can vary, based on how your system is set up. Measurements can include biparietal diameter, fetal trunk area, femur length, antero-postero trunk diameter and transverse trunk diameter, abdominal circumference, head circumference and spinal length.

1. Select ***EFW***.

   The system displays the required measurements.

2. Make each measurement.

   The system displays each measurement in the Results Window. The estimated fetal weight is displayed in the Results Window only with Tokyo or Osaka OB Type.

*NOTE: For a description of any of the required measurements, refer to that measurement.*

## Fetal Trunk Area (FTA)

To measure fetal trunk area, you make an ellipse, trace, spline trace or two distance measurements.

### Ellipse

1. Select ***FTA***; an active caliper displays.
2. If necessary, select ***Ellipse*** from the pop-up menu on the touch panel.
3. To position the active caliper, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second caliper, move the **Trackball**.
6. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, press the top **Trackball** key.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

## Fetal Trunk Area (FTA) (continued)

### Trace

1. Select ***FTA***; a caliper displays.
2. If necessary, select ***Trace*** from the pop-up menu on the touch panel.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.

   A dotted line shows the traced area.
6. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

HINTS

Before you complete the trace measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the dotted line but not the caliper, press **Clear** once.
- To clear the caliper and the current data measured, press **Clear** twice.

## Fetal Trunk Area (FTA) (continued)

### Spline Trace

1. Select ***FTA***; an active caliper displays.
2. If necessary, select ***Spline*** from the pop-up menu on the touch panel.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

*NOTE: The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).*

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

## Fetal Trunk Area (FTA) (continued)

### Two distances

1. Select ***FTA***; an active caliper displays.
2. If necessary, select ***Caliper*** from the pop-up menu on the touch panel.
3. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurement in the Results Window.

HINTS

- Before you complete a measurement:
  - To toggle between active calipers, press the top **Trackball** key.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

## Foot Length

To measure foot length, make one distance measurement:

1. Select ***Ft***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the foot length in the Results Window.

## Humerus Length

To measure humerus length, make one distance measurement:

1. Select ***HL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the humerus length in the Results Window.

## Nuchal Translucency (NT)

To measure nuchal translucency, make one distance measurement:

1. Select ***NT***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the nuchal translucency in the Results Window.

*NOTE: Nuchal Translucency is not available through the factory default. To enable Nuchal Translucency, add NT to the measurement folder in Utility -> Measure -> M&A -> Add measurement (Insert).*

## Occipitofrontal Diameter

To measure occipitofrontal diameter, make one distance measurement:

1. Select ***OFD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the occipitofrontal diameter in the Results Window.

## % Stenosis

In B-Mode, you can calculate % Stenosis by diameter or by area. See ‘% Stenosis’ on *page 7-87 for more information.*

## Spinal Length (SL)

To measure spinal length, make one distance measurement:

1. Select ***SL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the spinal length in the Results Window.

## Transverse Abdominal Diameter

To measure transverse abdominal diameter, make one distance measurement:

1. Select ***TAD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse abdominal diameter in the Results Window.

## Transverse Cerebellar Diameter

To measure transverse cerebellar diameter, make one distance measurement:

1. Select ***TCD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse cerebellar diameter in the Results Window.

## Thorax Transverse Diameter

To measure thorax transverse diameter, make one distance measurement:

1. Select ***ThD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the thorax transverse diameter in the Results Window.

## Tibia Length

To measure tibia length, make one distance measurement:

1. Select ***Tibia***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the tibia length in the Results Window.

## Ulna Length

To measure ulna length, make one distance measurement:

1. Select ***Ulna***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the ulna length in the Results Window.

## Volume

See ‘Volume’ on *page 7-89 for more information.*

## M-Mode Measurements

In M-Mode you can measure % stenosis, A/B ratio, and heart rate.

### % Stenosis

In M-Mode, you measure % Stenosis by diameter. See ‘% Stenosis’ on *page 7-96 for more information.*

### A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity. See ‘A/B Ratio’ on *page 7-97 for more information.*

### Heart Rate

See ‘Heart Rate’ on *page 7-98 for more information.*

## Doppler Mode Measurements

You can use Doppler mode to study fetal blood flow in the heart, umbilical cord, placenta, and middle cerebral arteries. OB/GYN Doppler mode also allows you to study uterine and ovarian blood flow.

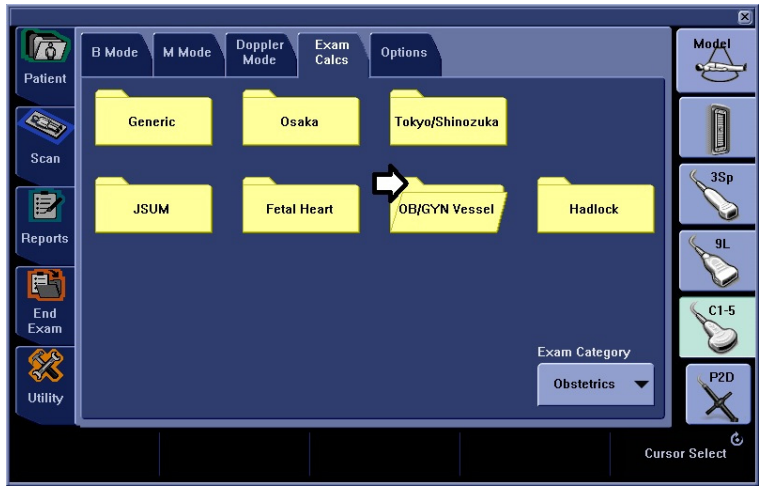



Figure 9-2. OB/GYN Vessel folder

## Doppler Mode Measurements (continued)

The OB/GYN vessel study includes the following vessels:

- Aorta (Ao)
- Desc. Aorta
- Middle Cerebral Artery (MCA) (right and left)
- Ovarian (right and left)
- Placenta
- Umbilical
- Uterine (right and left)

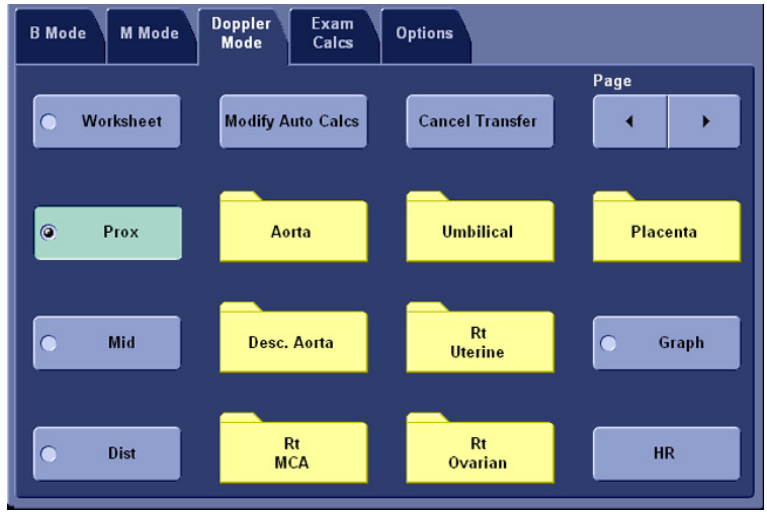



Figure 9-3. OB/GYN Vessels

## Doppler Mode Measurements (continued)

For each of these studies, you can make any of the following measurements:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- Pulsatility Index (PI)
- Resistive Index (RI)
- PS/ED Ratio
- ED/PS Ratio
- Acceleration
- AT
- TAMEAN
- Volume Flow
- PV

### To select OB/GYN vessel measurements

OB/GYN Vessel measurements use the auto sequence feature. With this feature, when you select a folder for the vessel you want to measure, the system automatically starts the first measurement. It then continues with each of the other measurements in that study.

1. Select the folder for the vessel you want to measure.

   The system shows all the measurements for that vessel. The caliper for the first measurement is automatically displayed.
2. Make the measurement.

   After you complete each measurement, the system starts the next measurement. After the last measurement is complete, the system returns to the OB/GYN Vessel touch panel.

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder for the vessel you want to measure.
2. Select Show All.

   The system display all possible vessel measurements.
3. Select the desired measurement.

The following pages describe the steps to make each specific measurement in the OB/GYN Vessel study.

## OB Worksheet

The OB Worksheet lists patient information, and all measurement and calculation data.

To view the OB Worksheet:

1. Press **Measure**.
2. Select ***Worksheet***.

Figure 9-4. OB Worksheet

The OB Worksheet has three sections of information:

1. Patient data
2. Measurement information
3. Calculation information

### Patient data

The Patient data section, at the top of the worksheet, lists information from the Patient Data Entry screen.

You can select the following fields:

- FetusNo – if this is a multi-gestational patient, you can select the fetus in this field. You can also adjust the **Fetus** selection to change the fetus.
- CUA/AUA – select the ultrasound age calculation method
  - Composite Ultrasound Age (CUA) – regression calculation
  - Average Ultrasound Age (AUA) – an arithmetic average

  You can select the method in this field, or adjust the **Select CUA/AUA** control.

*NOTE:* *CUA/AUA is only available when you select USA OB Type in the Utility -> System -> System Measure menu.*

You can enter information in the following fields:

- FetusPos – type information about the fetus position.
- PLAC – type information about the placenta.

### Measurement information

This section lists the results of all measurements.

- CUA or AUA – If this field is checked, the system uses the measurement to calculate the ultrasound age.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1–m3 – Up to three measurement values for each item. If you make more than three measurements, the worksheet uses the last three.
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, or last. To change the method:
  a. Move the **Trackball** to the Method field.
  b. Press **Set**.
  c. Move the **Trackball** to select from the list.
  d. Press **Set**.
- AGE – The fetal age for this measurement.
- Range – The typical range of fetal age for this measurement.

## Calculation information

This section of the worksheet provides calculation choices and lists calculation results.

- EFW – lists the parameters used to calculate EFW. This is followed by the calculation result.

  To change which parameters are used:

  a. Select this field or press ***Select EFW***.

  b. Select the desired parameters.

- EFW GP – lists the source used to calculate EFW–GP (growth percentile). This is followed by the growth percentile.

  To change the source:

  a. Select this field or press ***Select GP***.

  b. Select the desired source.

The remaining calculation information shows ratios for several measurements, and the Cephalic Index (CI).

The worksheet shows if any of the ratios are out of range (OOR). Out of range indicates one of the following:

- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement is outside of the range for the data used in the calculation. That means that the measurement is either less than or more than the range of measurements used to determine fetal age based on the measurement.

For more information about how to use the worksheet, see ‘Viewing and Editing Worksheets’ on *page 7-77* for more information.

# Anatomical Survey

## Overview

The Anatomical Survey page provides a checklist that indicates which anatomy was imaged and its appearance.

Figure 9-5. Anatomical Survey

## Editing

- To activate the Anatomical Survey, select ***Anatomy*** on the OB Worksheet touch panel.

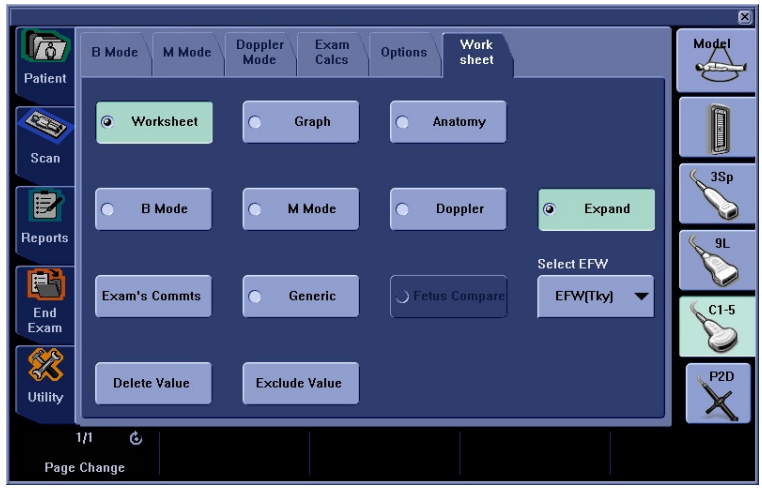



Figure 9-6. OB Worksheet touch panel

- Fill the required field.

Table 9-3: Anatomical Survey

| Field | Description |
|---|---|
| Fetus Pos | Indicate the fetal position within the uterus. |
| PLAC | Identify the location of the placenta. |
| ANATOMY | Enter the following information for each part of the anatomy imaged:<br>1. Imaged? : Check the box that you did image this part of the anatomy.<br>2. Appearance : If you checked the Imaged? box, indicate whether the appearance was normal or abnormal. |
| | You can add the required anatomy up to 9 additional anatomy.<br>Move the Trackball to the blank field.<br>Enter the anatomy name. |

Table 9-3: Anatomical Survey (Continued)

| Field | Description |
|---|---|
| BIOPHYSICAL | The score is _ of 10 possible total points, depending upon the number of parameters entered. Enter the following information to assess the fetus's biophysical well-being. |
| Movement | Type 0, 1 or 2 |
| Tone | Type 0, 1 or 2 |
| Breathing | Type 0, 1 or 2 |
| Fluid | Type 0, 1 or 2 |
| Reactive NST (Reactive non-stress test) | Type 0, 1 or 2 |
| COMMENTS | Free text |

Select Exit to return to the Scan screen.

Select Worksheet to return to the Worksheet or Graph to enter the OB Graph screen on the touch panel.

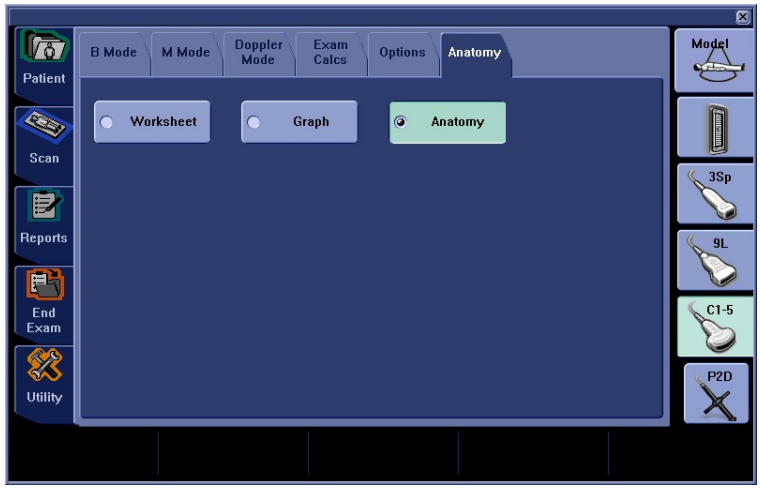



Figure 9-7. Anatomical Survey touch panel

*NOTE: The patient specific contents input on the Anatomical Survey page are returned to the factory default settings after starting a new patient.*

# OB Graphs

## Overview

OB Graphs allow you to assess fetal growth compared to a normal growth curve. When a patient has completed two or more ultrasound exams, you can also use the graphs to look at fetal trending. For multi-gestational patients you can plot all fetuses and compare the growth on the graphs.

The LOGIQ S7 Expert/Pro provides the following two basic types of graphs:

- **Fetal Growth Curve graphs** – show one measurement per graph. These graphs show the normal growth curve, positive and negative standard deviations or applicable percentiles, and ultrasound age of the fetus using the current measurement. For multi-gestational pregnancies, you can view all fetuses. If previous exam data is available, the graph can show fetal trending.
- **Fetal Growth Bar graph** – shows the ultrasound age and the gestational age based on patient data. Plots all measurements on one graph.

## To View OB Graphs

To view OB graphs:

1. Press **Measure**.
2. Select ***Graph***.

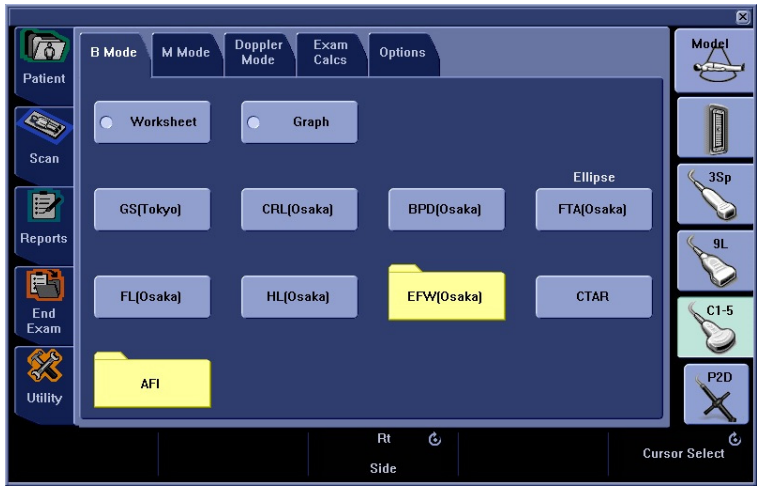



Figure 9-8. touch panel - example

After you select ***Graph Display***, the system displays the OB Graph keys on the touch panel.

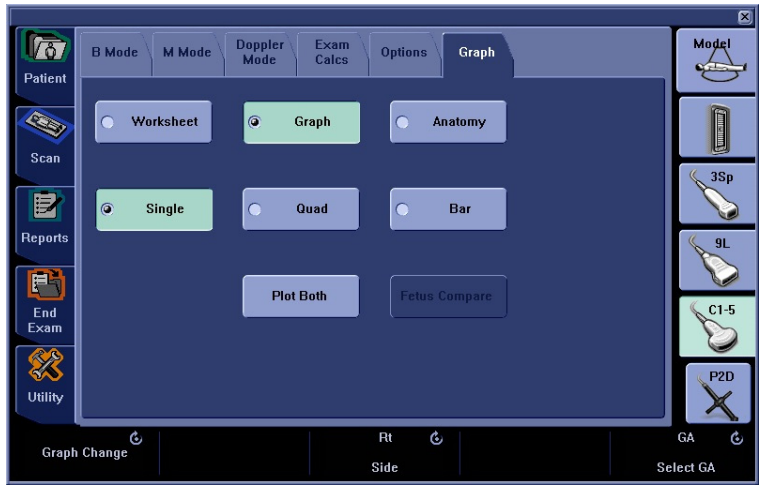



Figure 9-9. OB Graph keys on touch panel

## Fetal Growth Curve Graph

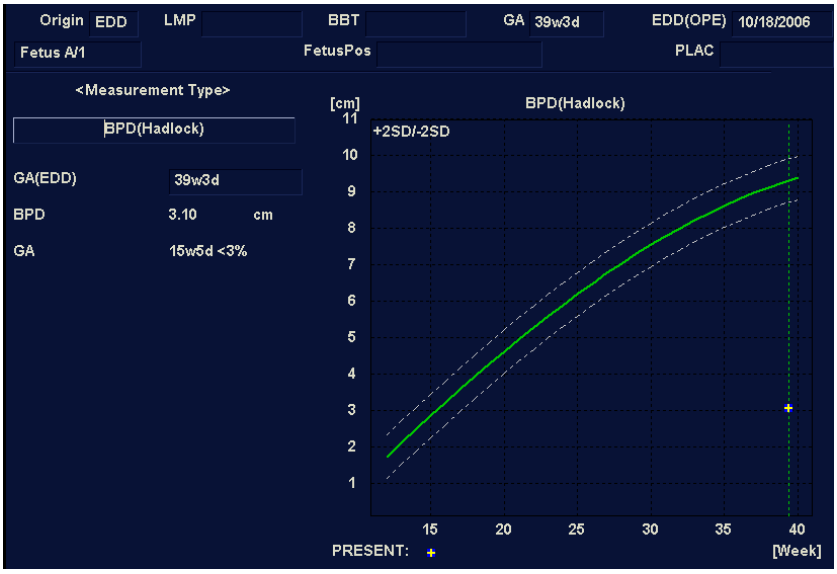



Figure 9-10. Fetal Growth Curve Graph

The horizontal axis shows the fetal age in weeks. The system determines this age from the data on the Patient Data Entry screen. The vertical axis shows one of the following:

- For measurements, mm or cm
- For ratios, percent
- For fetal weight, grams

The Fetal Growth Curve Graph shows the following information for the selected measurement:

- The normal growth curve
- The standard deviations or relevant percentiles
- The gestational age of the fetus, using patient data (vertical dotted line)
- Using the current ultrasound measurement data, where the fetus is on the growth curve

The legend at the bottom of the graph shows the symbols and colors that indicate data for fetal trending (Past and Present) and multiple gestation (Fetus).

**To select the measurement**

To select which measurement you want to display on the Fetal Growth Curve Graph, do one of the following:

- To select a specific measurement:
  a. On the graph display, move the **Trackball** to the Measurement Type field and press **Set**.

     The system displays a list of measurements.

  b. Move the **Trackball** to select the desired measurement and press **Set**.

     The system displays the Fetal Growth Curve Graph for the selected measurement.
- To scroll through all Fetal Growth Curve Graphs, adjust the **Graph Change** control.

### To select the age to use

To plot the fetus age, the system allows you to use the gestational age (GA) from the LMP, or to use the composite ultrasound age (CUA). To select, adjust the **Select GA** control. The information in the left column changes between CUA and GA(EDD), and the data may change.

### To view a single or four graphs

You can view either a single Fetal Growth Curve Graph or you can view four graphs at the same time. To select each view, press ***Single*** or ***Quad***.

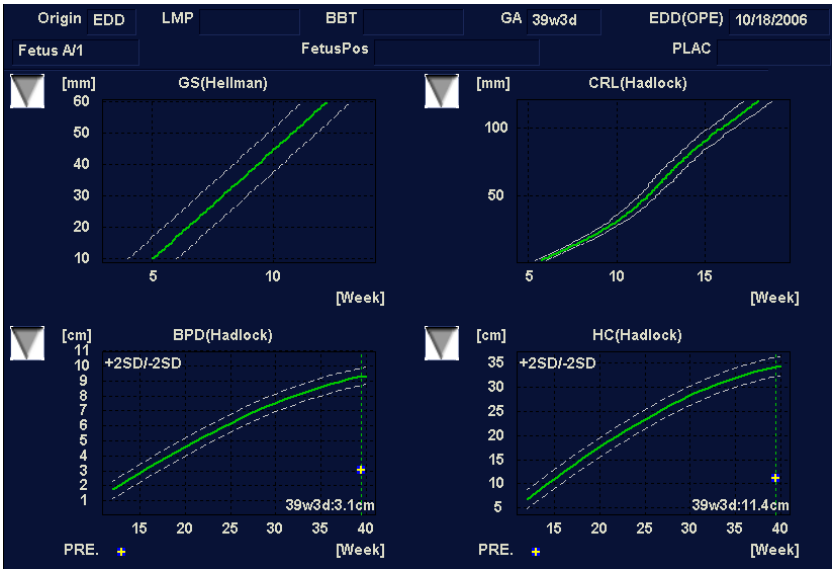



Figure 9-11. Fetal Growth Curve Graph: Quad View

The measurement values are displayed at the bottom of the graph.

**To change measurements in quad view**

When you view four graphs simultaneously, you can select which four you want to see. To change each graph in quad view:

1. On the graph display, use the **Trackball** to move the cursor to the small box that is upper left of each graph, then press **Set**.

   The system displays a list of measurements.

2. Move the **Trackball** to select the desired measurement and press **Set**.

   The system displays the Fetal Growth Curve Graph for the selected measurement.

To scroll through all Fetal Growth Curve Graphs, adjust the **Graph Change** control.

The order of a quad graph view can be saved by selecting **Save**.

## Fetal Trending

When you have ultrasound data for more than one exam for a patient, you can use the data to look at fetal trending on the Fetal Growth Curve Graphs.

1. Select ***Graph Display*** and select the desired Fetal Growth Curve Graph.
2. Select ***Plot Both***.

   The system automatically finds the data from previous ultrasound exams, and displays it on the graph with the present data.

Figure 9-12. Fetal Trending on Fetal Growth Curve Graph

The legend at the bottom of the graph shows the symbols and colors that indicate Past and Present data.

## Fetal Trending (continued)

### To manually enter past exam data

If you have data from a previous ultrasound exam that you want to use for fetal trending, but it is not in the system, you can manually enter the data.

1. After you have registered the patient for this exam, on the Patient Data Entry screen, in the Exam Information (Obstetrics) section, select Past Exam.

   The system displays the Input Past Exam screen. See Figure 9-13.
2. Enter the data from previous exams.
3. To enter data on page 2, select Next.
4. After you enter the previous exam data, select Exit to Save.

   The system saves the previous exam data. When you view the Fetal Growth Curve Graphs, select ***Plot Both*** to view fetal trending. The system automatically uses the data you entered.

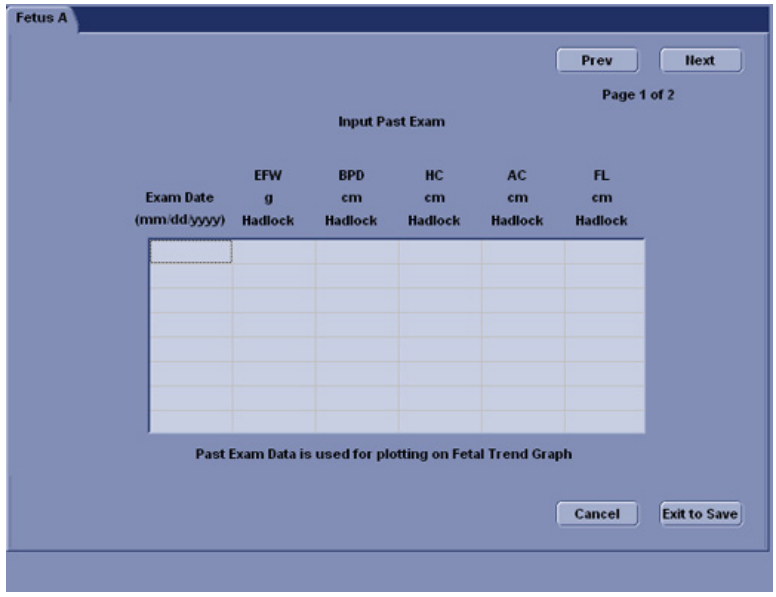



Figure 9-13. Input Past Exam screen, page 1

## Fetal Trending (continued)

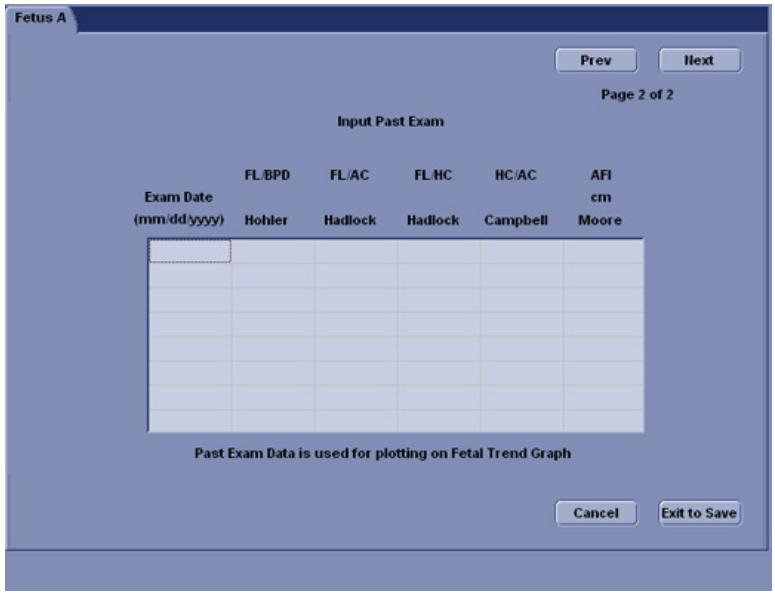



Figure 9-14. Input Past Exam screen, page 2

## To edit patient data

When you are working with graphs, you can change or enter the following patient data.

- GA(LMP) – this field is computed using the LMP date on the Patient Data Entry screen. To change this field:

*NOTE:* *You can only change this field on the Fetal Growth Curve Graph in single view.*

a. Move the **Trackball** to the field, which is left of the graph. To select the field, press **Set**.

   The system displays a window with the GA weeks and days.

b. To select each field, move the **Trackball** to the field and press **Set**.

c. Type the correct weeks or days.

d. Select OK.

   The system makes the following changes:

   - GA (LMP) is now GA (GA) and shows the age you entered.
   - In the Patient Data section, the GA changes.
   - In the Patient Data section, The EDD (LMP) changes to EDD(GA) and shows an updated date, using the GA you entered.

     The LMP is erased.

- FetusPos – type information about the fetus position.
- PLAC – type information about the placenta.

## To return from a graph to the scan display

After viewing graphs, to return to the scan display, do one of the following:

- On the graph display, select Exit.
- On the touch panel, select ***Graph***.

## Fetal Growth Bar Graph

The fetal growth bar graph shows current exam measurements and the normal growth range based on the gestational age. It shows all measurements on one graph.

To view the Fetal Growth Bar Graph:

1. Press **Measure**.
2. Select ***Graph***.
3. Select ***Bar***.

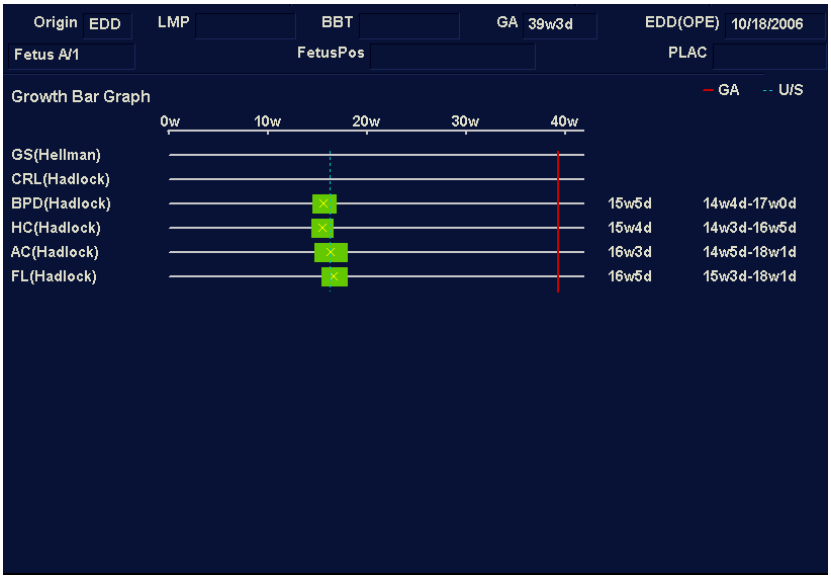



Figure 9-15. Fetal Growth Bar Graph

## Fetal Growth Bar Graph (continued)

- The horizontal axis shows the gestational weeks.
- The red vertical line shows the gestational age using the patient data.
- The blue dotted vertical line shows the ultrasound age using the current measurements.
- The yellow x shows the ultrasound age for each measurement.
- The green rectangle shows the normal age range for the measurement.

You cannot do fetal trending or view multiple gestation data on the bar graph.

# OB-Multigestational

## Multiple Fetus

LOGIQ S7 Expert/Pro allows you to measure and report multiple fetus development. The system can report a maximum of four fetuses.

### To enter the number of fetuses

If more than one fetus is imaged during the exam, enter the number of fetuses in the Patient Data Entry Menu.

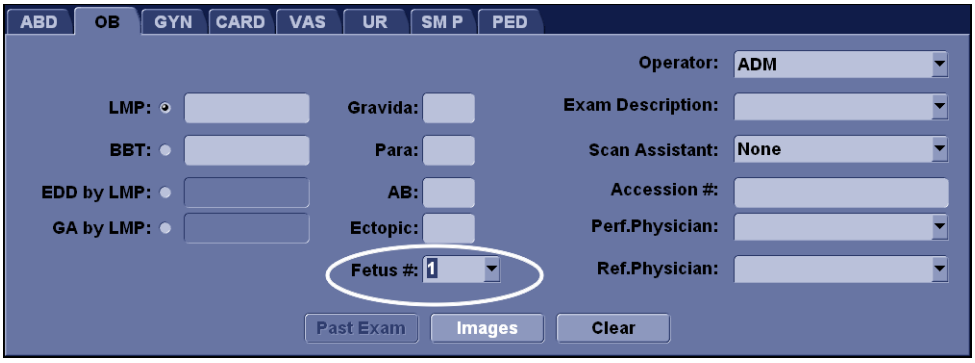



Figure 9-16. Fetus Number

When you start an OB exam, the system automatically fills in the Fetus # field with 1. To change the number:

1. Move the cursor to the fetus number and press **Set** twice.

   The number is highlighted.
2. Type the correct number and press **Set**.

   The system displays a message to confirm that you want to change the fetus number.
3. Select Yes.

### To identify each fetus

For measurements, calculations, and worksheet displays, the system labels each fetus A, B, C, or D. Each fetus is identified by a letter and the total number of fetuses. For example, fetus A/3 is fetus A from a total of 3.

When scanning, you can enter information about the fetus position and placenta location. You can enter the information in the Patient Data section of the worksheets and the graphs. You can type up to 23 characters in the FetusPos and PLAC fields.

Figure 9-17. Patient Data section of the OB Worksheet

### To select a fetus

During measurements and calculations, to change between fetuses, do one of the following:

- Adjust the **Fetus** selection.
- Move the **Trackball** to the Summary Window and select the fetus.

Figure 9-18. Summary Window: Multiple fetus

You can change between fetuses at any time during the exam.

*NOTE: After you change to the next fetus, any measurements you make are recorded and reported to that fetus. If you have any active measurement or calculation that is not completed when you change the fetus, the system cancels the measurement or calculation.*

### To view multiple fetuses data on graphs

You can view multiple gestation data on fetal growth curve graphs. After you have made measurements for each fetus, select ***Graph***.

1. To view the graph for each fetus, do one of the following:
   - Adjust the **Fetus** selection.
   - In the Patient Data section, move the **Trackball** to highlight the FetusNo field. In the list of fetuses, move the **Trackball** to select the fetus you want, and press **Set**.
2. To display data for multiple fetuses on the same graph, select ***Fetus Compare***.

Figure 9-19. Fetal Growth Curve Graph: Fetus Compare

The legend at the bottom of the graph shows the symbols and colors that represent each fetus.

## To compare multiple fetus data on a worksheet

With multiple fetuses, you can list and compare measurements of the fetuses on the worksheet.

Select ***Worksheet***, then select ***Fetus Compare***.

Figure 9-20. OB Worksheet Display touch panel

**To compare multiple fetus data on a worksheet (continued)**

When you select ***Fetus Compare***, the system lists the measurement results for each fetus on the Worksheet.

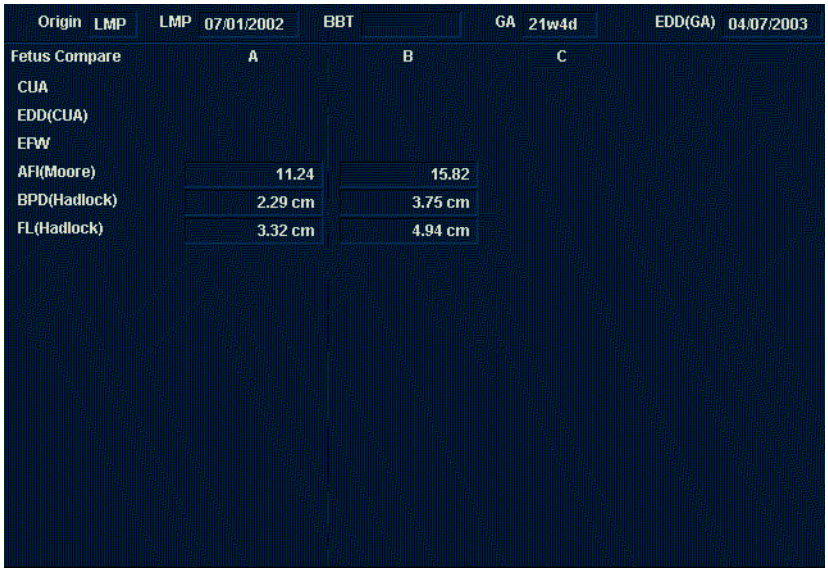



Figure 9-21. Worksheet Display with Fetus Compare

### To Show Fetal Trending for Multiple Fetuses

When you have data for more than one exam, you can show fetal trending and compare fetuses on one graph.

To view fetal trending for multiple fetuses:

1. Select ***Graph***.
2. Select ***Fetus Compare***.
3. Select ***Plot Both***.

*NOTE: You can only view fetal trending for multiple fetuses in single graph display.*

The symbol key for fetal trending and multiple fetuses is shown at the bottom of the graph.

# OB Table Editor

You can add user programmable OB tables to the system.

## OB Table Settings Menu

You add OB Tables in the Measurement & Analysis menu. To open the menu:

1. On the touch panel, select ***Utility***, then select ***M&A***.
2. Check the Exam Category on the far left of the monitor screen. Make sure that Obstetrics is selected.

   If it is not selected, select Obstetrics and continue selecting the folders until the appropriate area is selected as to where this new OB Table will be entered. For example, select Obstetrics, then select OB-2/3. If there are further folders within OB-2/3, select that appropriate folder.

## OB Table Settings Menu (continued)

3. On the monitor display, select the OB Table tab.
   The system displays the OB Table settings menu.

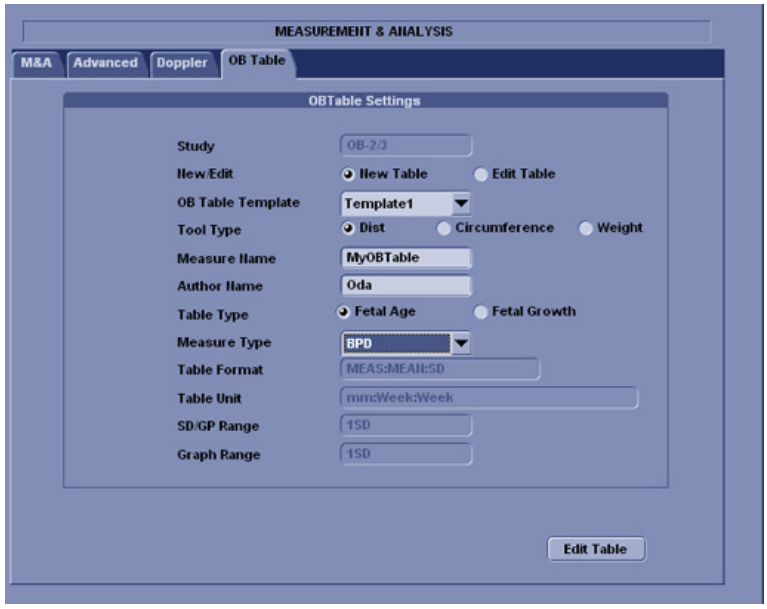



Figure 9-22. OB Table settings

## OB Table Settings Menu (continued)

4. The OB Table settings menu lists OB Table parameters. Specify the following parameter values as appropriate:
   - **Study**: Shows the study to which this measurement table belongs.
   - **New/Edit**: To create a new OB table, select New Table. To edit an existing user-programmable OB table, select Edit Table.

*NOTE: You cannot edit the system's OB Tables.*

   - **OB Table Template**: To create a new OB table, select the Template (1 - 7) which you want to use as the basis of the user programmable OB Table.

     To edit an existing user OB table, select the desired OB table to edit.
   - **Tool Type**: Select the type of measurement: Distance or Circumference.
   - **Measure Name**: Type the name of measurement that will display on the touch panel.
   - **Author Name**: Type the author's name.
   - **Table Type**: If necessary, select the Table Type: Fetal Age or Fetal Growth.
   - **Measure Type**: Select a measurement type that can be used to calculate EFW, for example BPD.

*NOTE: Measure Type is used only when calculating EFW.*

*NOTE: The following items are display only: Table Format, Table Unit, SD/GP Range, and Graph Range. The system determines these values automatically, based on the type of OB table you are creating.*

5. After specifying all parameter values, move the **Trackball** to *Edit Table* and press **Set**.

   The system displays the Edit Menu.

*NOTE: If any of the OB table parameters are not correct, the Edit Menu is not displayed.*

## OB Table Templates

Tool Type:

- Distance: 2D Caliper
- Circumference: 2D Ellipse, 2D Trace, 2D Caliper

### Template 1

Table 9-4: Template 1 (based on Hadlock)

| Template 1: SD Range Table | | | | |
|---|---|---|---|---|
| Fetal Age Table | Table Format | MEAS | MEAN | SD |
| | Table Unit | mm | Week | Week |
| | Table Range | 1SD | | |
| | Graph Range | 1SD | | |
| Measurement Result | Value [cm] | | | |
| | GA [#w#d] | | | |
| | Min [#w#d] | | | |
| | Max [#w#d] | | | |
| Fetal Growth Table | Table Format | AGE | MEAN | SD |
| | Table Unit | Week | mm | Week |
| | Others are same as above | | | |

## Template 2

Table 9-5: Template 2 (based on Tokyo)

| Template 2: SD Range Table | | | | |
|---|---|---|---|---|
| Fetal Age Table | Table Format | MEAS | MEAN | SD |
| | Table Unit | mm | Day | Day |
| | Table Range | 1SD | | |
| | Graph Range | 1SD | | |
| Measurement Result | Value [cm] | | | |
| | GA [#w#d] | | | |
| | SD: day(+/-) | | | |
| | EDD (Date) | | | |
| | GA-Min [#w#d] | | | |
| | GA-Max [#w#d] | | | |
| Fetal Growth Table | Table Format | AGE | MEAN | SD |
| | Table Unit | Day | mm | Day |
| | Others are same as above | | | |

## Template 3

Table 9-6: Template 3 (based on Osaka)

| Template 3: SD Table | | | | |
|---|---|---|---|---|
| Fetal Age Table | Table Format | MEAS | MEAN | SD |
| | Table Unit | mm | Day | mm |
| | Table Range | 1SD | | |
| | Graph Range | 1SD | | |
| Measurement Result | Value [cm] | | | |
| | GA [#w#d] | | | |
| | SD: sd=(mv-pv)/sd | | | |
| | EDD (Date) | | | |
| | GA-Min [#w#d] | | | |
| | GA-Max [#w#d] | | | |
| Fetal Growth Table | Table Format | AGE | MEAN | SD |
| | Table Unit | Day | mm | mm |
| | Others are same as above | | | |

## Template 4

Table 9-7: Template 4 (based on several European tables)

| Template 4: 5%-95% Table | | | | | |
|---|---|---|---|---|---|
| Fetal Age Table | Table Format | MEAS | MIN | MEAN | MAX |
| | Table Unit | mm | WeekDay | WeekDay | WeekDay |
| | Table Range | 5%:95% | | | |
| | Graph Range | 5%:95% | | | |
| Measurement Result | Value [cm] | | | | |
| | GA [#w#d] | | | | |
| | GP [%]<br>GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system, | | | | |
| | EDD (Date) | | | | |
| | GA-Min [#w#d] | | | | |
| | GA-Max [#w#d] | | | | |
| Fetal Growth Table | Table Format | AGE | MIN | MEAN | MAX |
| | Table Unit | WeekDay | mm | mm | mm |
| | Table Range | 5%:95% | | | |
| | Graph Range | 5%:95% | | | |

## Template 5

Table 9-8: Template 5 (based on several European tables)

| Template 5: 5% - 95% Table | | | | |
|---|---|---|---|---|
| Fetal Age Table | Table Format | MEAS | MEAN | SD |
| | Table Unit | mm | WeekDay | mm |
| | Table Range | 1SD | | |
| | Graph Range | 5%:95% | | |
| Measurement Result | Value [cm] | | | |
| | GA [#w#d] | | | |
| | GP [%]<br>GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system, | | | |
| | EDD (Date) | | | |
| | GA-Min [#w#d] | | | |
| | GA-Max [#w#d] | | | |
| Fetal Growth Table | Table Format | AGE | MEAN | SD |
| | Table Unit | WeekDay | mm | mm |
| | Table Range | 1SD | | |
| | Graph Range | 5%:95% | | |

## Template 6

Table 9-9: Template 6 (based on several European tables)

| Template 6: 10% - 90% Table | | | | | |
|---|---|---|---|---|---|
| Fetal Age Table | Table Format | MEAS | MIN | MEAN | MAX |
| | Table Unit | mm | WeekDay | WeekDay | WeekDay |
| | Table Range | 10%-90% | | | |
| | Graph Range | 10%-90% | | | |
| Measurement Result | Value [cm] | | | | |
| | GA [#w#d] | | | | |
| | GP [%]<br>GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system, | | | | |
| | EDD (Date) | | | | |
| | GA-Min [#w#d] | | | | |
| | GA-Max [#w#d] | | | | |
| Fetal Growth Table | Table Format | AGE | MIN | MEAN | MAX |
| | Table Unit | WeekDay | mm | mm | mm |
| | Table Range | 10%-90% | | | |
| | Graph Range | 10%-90% | | | |

## Template 7

Table 9-10: Template 7 (Based on several european tables)

| Template 7: 10% - 90% Table | | | | |
|---|---|---|---|---|
| Fetal Age Table | Table Format | MEAS | MEAN | SD |
| | Table Unit | mm | WeekDay | mm |
| | Table Range | 1SD | | |
| | Graph Range | 10%:90% | | |
| Measurement Result | Value [cm] | | | |
| | GA [#w#d] | | | |
| | GP [%]<br>GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system, | | | |
| | EDD (Date) | | | |
| | GA-Min [#w#d] | | | |
| | GA-Max [#w#d] | | | |
| Fetal Growth Table | Table Format | AGE | MEAN | SD |
| | Table Unit | WeekDay | mm | mm |
| | Table Range | 1SD | | |
| | Graph Range | 10%:90% | | |

## OB Table Edit Menu

The data you enter in the OB Table Edit Menu depends on whether the table type is Fetal Age or Fetal Growth.

### Fetal Age Table

If you are creating or editing a Fetal Age table, the OB Table Edit Menu is as follows:

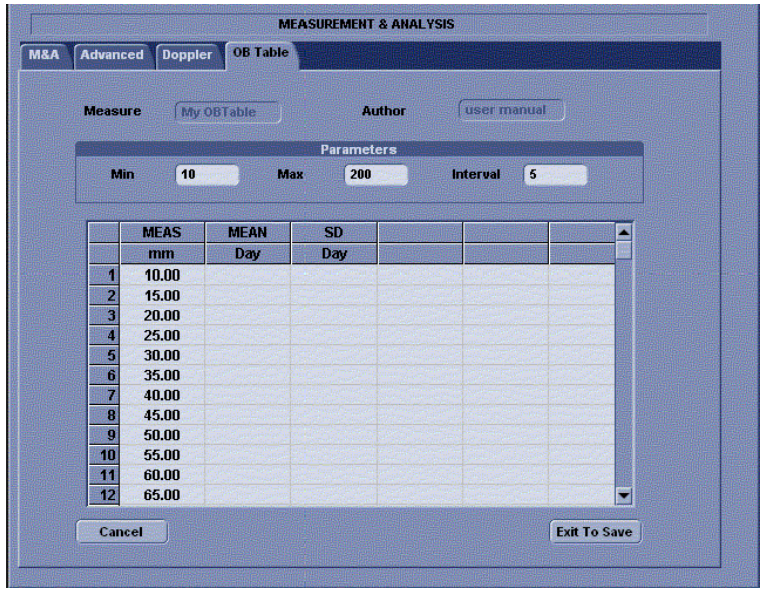



Figure 9-23. OB Table Edit Menu: Fetal Age Table

**Complete the field**

1. Input value to Min, Max and Interval of the Parameters field.

   The system automatically fills in the MEAS column.

   Input value to the columns of MEAN and SD.

*NOTE: To move between the fields in the table, use the up, down, left, and right arrow keys.*

*NOTE: You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.*

To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want cancel this table, move the **Trackball** to Cancel and press **Set**.

## Fetal Growth Table

If you are creating or editing a Fetal Growth table, the OB Table Edit Menu is as follows:

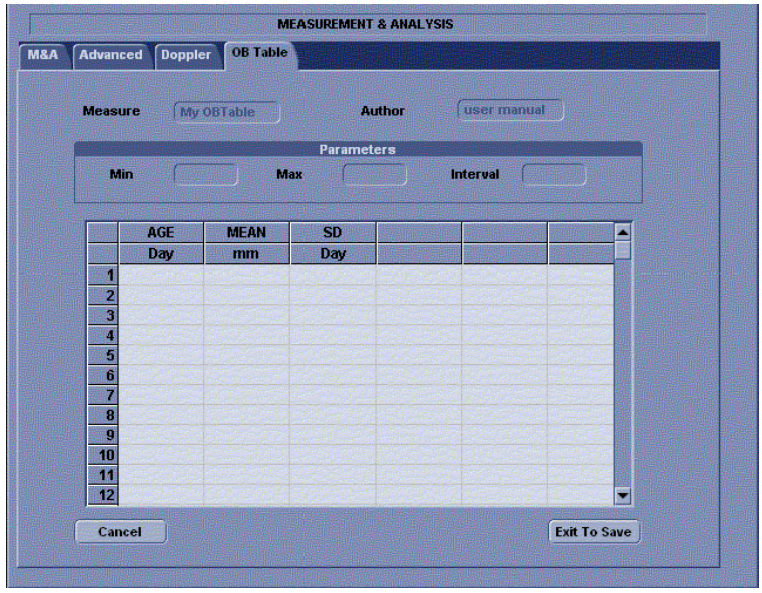



Figure 9-24. OB Table Edit Menu: Fetal Growth Table

### Complete the field

1. Input value to the required columns.

*NOTE: To move between the fields in the table, use the up, down, left, and right arrow keys.*

*NOTE: You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.*

2. To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want cancel this table, move the **Trackball** to Cancel and press **Set**.

After you complete the OB table, it is now available for the selected study. To use the measurement, you must assign it to a touch panel. See ‘Measurement and Calculation Setup’ on *page 7-16 for more information.*

## EFW for OB User Table/Formula Editor

### EFW Table Editor

You can edit an EFW Formula at the OB Table Editor.

1. Select Utility -> Measure -> OB Table.
2. Select the appropriate parameters and press ***Edit Table***.
   - New/Edit: Select “New Table”
   - OB Table Template: Select appropriate template.
   - Tool Type: Select “Weight”
   - Measure Name: Enter measurement name.
   - Author Name: Enter author’s name.
   - Table Type: Select “Fetal Age”

Figure 9-25. OB Table Tab Screen

## EFW Table Editor (continued)

3. Edit the table data and press ***Exit To Save***.

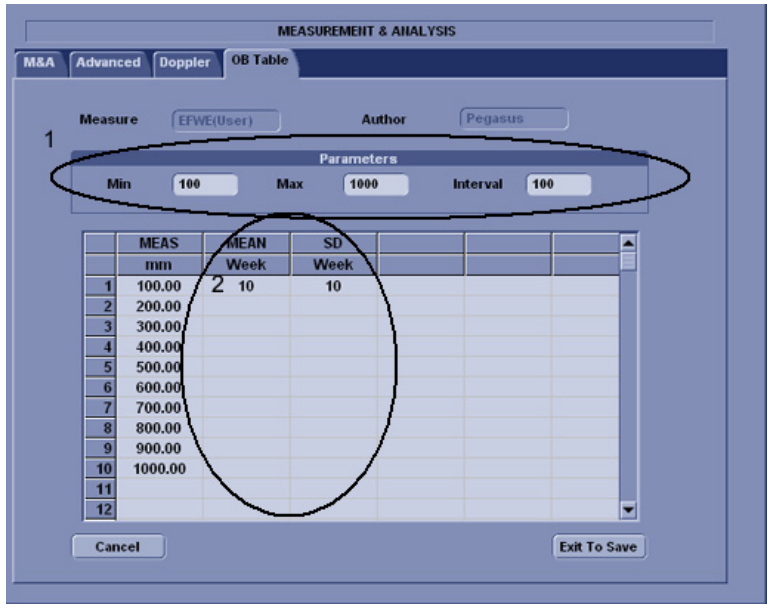



Figure 9-26. OB Table Editor Screen

## EFW Formula Editor

1. Select the M&A tab and select ***Edit Calc***. The Modify User CALC window displays.

   Select the user table previously added from the User Defined pull-down menu and press ***OK***.

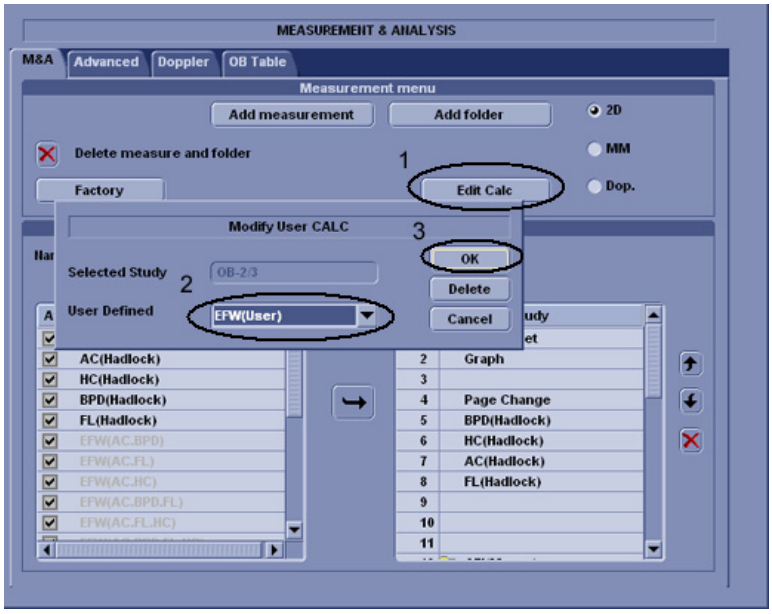



Figure 9-27. Modify User CALC window

## EFW Formula Editor (continued)

2. Select the “Calculated” button for the EFW parameter.

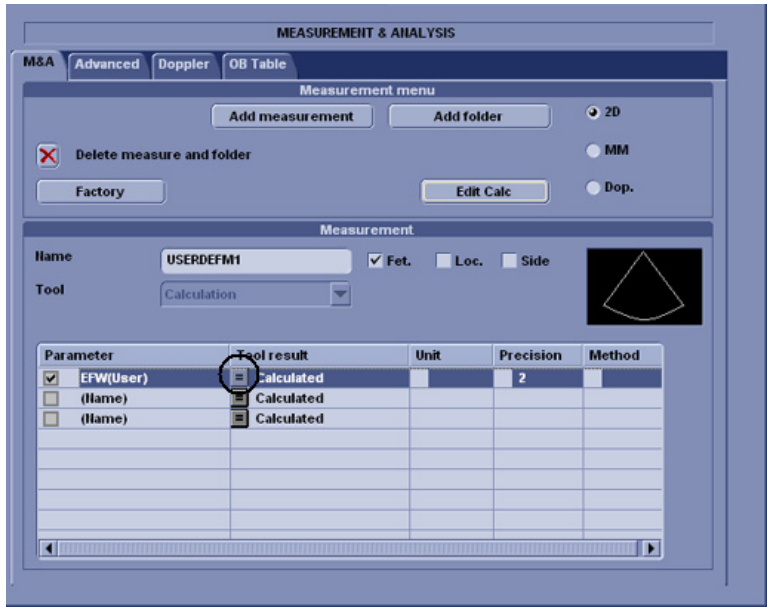



Figure 9-28. M&A Tab Screen

## EFW Formula Editor (continued)

3. The EDIT FORMULA window displays. Edit the formula and select ***OK***.

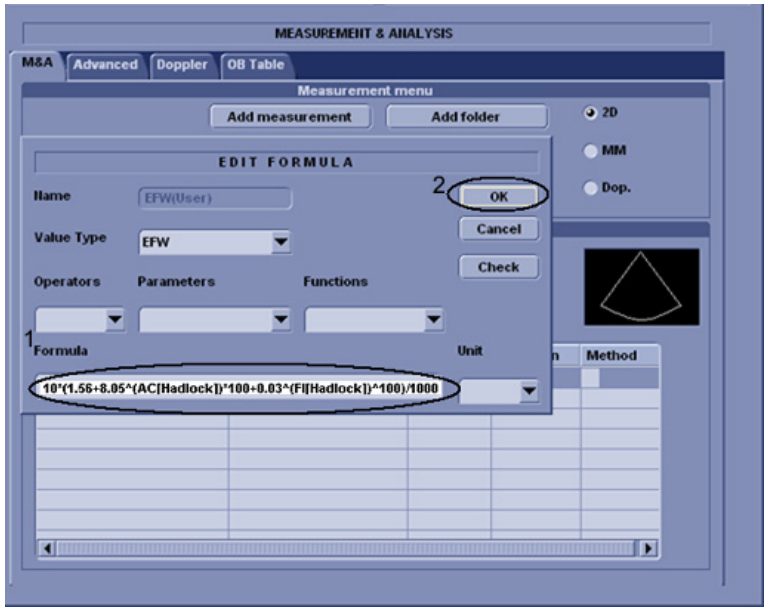



Figure 9-29. EDIT FORMULA window

*NOTE: When you edit a formula, be careful of the following points.*

- If you want to calculate EFW by centimeter, add " *100 " to the {parameter}.
- If EFW is calculated in grams, add " /1000 " to the formula.

or example,

10^(1.56{AC[Hadlock]}*100+0.08*{FL[Hadlock]}*100)/1000

# GYN Measurements

## Introduction

The Gynecology exam category includes the following three studies:

- Generic. This study is common to all exam categories. See ‘Generic Measurements’ on *page 7-82 for more information.*
- General Gynecology. This study includes uterine, ovarian, ovarian follicle, and endometrium measurements.
- OB/GYN Vessel. This study includes the following vessels: uterine, ovarian, umbilical, middle cerebral artery, aorta, placenta, and descending aorta.

*NOTE: The calculation formulas are listed in the Advanced Reference Manual.*

## To Start a Gynecology Exam

To begin a gynecology exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

For details about how to start an exam, See ‘To Start an Obstetrics Exam’ on *page 9-4 for more information.*

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
   - On the keyboard, press ***Esc***.
   - On the touch panel, select ***Scan***.
   - On the Control Panel, select **Freeze**.
   - On the Control Panel, press the B-Mode key.

   The system displays the Scan screen.
2. To choose the appropriate probe, select the probe icon on the touch panel.
3. On the Control Panel, press ***Measure***.

   The default Gynecology study is displayed on the touch panel.

## To Start a Gynecology Exam

To begin a gynecology exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

For details about how to start an exam, See ‘To Start an Obstetrics Exam’ on *page 9-4 for more information.*

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
   - On the keyboard, press ***Esc***.
   - On the touch panel, select ***Scan***.
   - On the Control Panel, select **Patient** or **Freeze**.
   - On the Control Panel, press the B-Mode key.

   The system displays the Scan screen.
2. To choose the appropriate probe, select the probe icon on the touch panel.
3. On the Control Panel, press ***Measure***.

   The default Gynecology study is displayed on the touch panel.

## B-Mode Measurements

In B-Mode, you make the measurements in the General Gynecology study. These measurements include:

- Uterine length, width, and height
- Ovarian length, width, and height
- Ovarian follicle
- Cervix
- Endometrium thickness

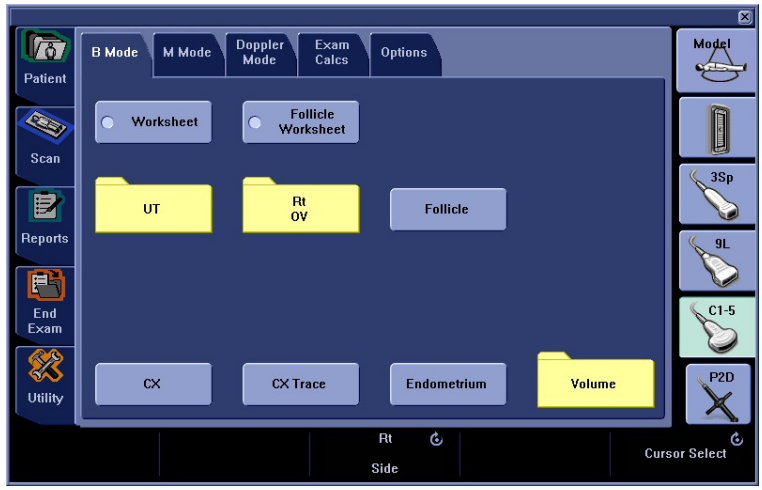



Figure 9-30. General Gynecology study

## Follicle measurements

You can make left and right ovary follicle measurements from one, two, or three distances.

### One distance

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. To position the active caliper at the start point, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
6. To complete the measurement, press **Set**.
7. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

## Follicle measurements (continued)

### Two distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.
5. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

## Follicle measurements (continued)

### Three distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second distance measurement, the system displays an active caliper.
4. To make the second and third distance measurement, repeat steps a–d above.

   After the third measurement, the system displays the ovary follicle measurement in the Results Window.

## Endometrium thickness

To measure the endometrium thickness, make one distance measurement.

1. Select ***Endometrium***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the endometrium thickness in the Results Window.

## Ovary length, width, and height

You can measure the length, width, and height of the left and right ovaries. Each measurement is a typical distance measurement made in the appropriate scan plane.

Typically, length and height are measured on the saggital plane while the width is measured on the axial/transverse plane.

To measure ovarian length, width, or height:

1. Scan the patient's right or left ovary in the appropriate plane.
2. To select left or right, adjust the **Side** selection.
3. Select the ***OV*** folder, then select ***OV L***, ***OV W***, or ***OV H***.
4. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
5. To make the second and third distance measurements, repeat steps 3–4.

   After you complete the length, width, and height measurements, the system displays the ovarian volume in the Results Window.

### Uterus length, width, and height

Each of these is a standard distance measurement. Typically, length and height are measured on the sagittal plane while the width is measured on the axial/transverse plane.

To measure uterus length, width, or height:

1. Scan the patient in the appropriate scan plane.
2. Select the ***UT*** folder, then select ***UT L***, ***UT W***, or ***UT H***.

   An active caliper displays.
3. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the uterine volume in the Results Window.

## Cervix measurements

You can make cervix measurements from one distance or spline trace.

### One Distance

1. Select ***CX***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the cervix measurement in the Result Window.

### Spline Trace

1. Select ***CX Trace***; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**. The first caliper turns yellow. The second caliper appears at the same position as the first caliper and is green.
4. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.

   The spline trace requires at least three points to draw the trace. Continue setting the points of the trace until the desired points are set.
5. Press **Set** again after the last caliper is fixed to finalize the spline trace. All points are removed from the line and the spline trace turns yellow.

*NOTE:* *Presssing **Set** twice finishes the trace measurement.*

The system displays the cervix measurement in the Result Window.

# *Chapter 10*

# Cardiology

*Describes how to perform cardiac measurements and calculations.*

# Cardiology Exam Preparation

## Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

## General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the touch panel Menu.

# Cardiology Measurements

## Overview

Cardiology measurements offer two different types of measurement studies, Generic and Cardiac.

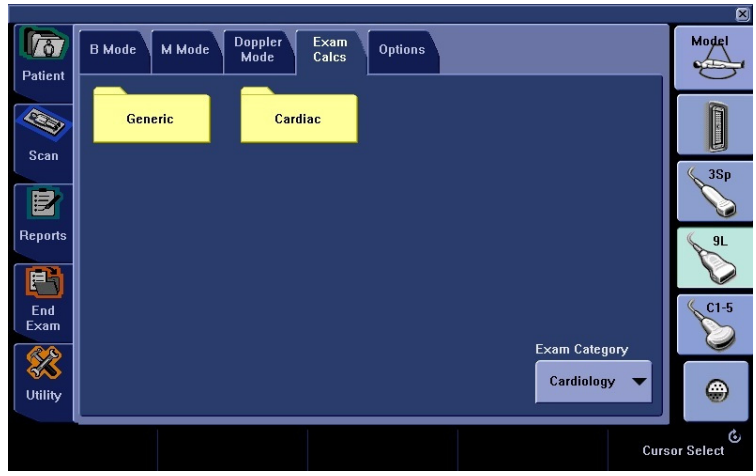



Figure 10-1. touch panel - Cardiac Exam Calc

- Generic – Each exam category has a Generic study. The Generic studies provide you quick access to measurements.
- Cardiac – This study includes all cardiac measurements.

## Naming Format for Cardiac Measurements

When you make a measurement, on the touch panel you select the abbreviation for the measurement. Most abbreviations are made using acronyms. The following table lists acronyms used for naming cardiac measurements.

Table 10-1: Cardiology Abbreviations

| Acronym | Name |
|---|---|
| % STIVS | % Interventricular Shortening |
| A | Area |
| Acc | Acceleration |
| AccT | Flow Acceleration Time |
| ALS | Aortic Leaflet Separation |
| Ann | Annulus |
| Ao | Aorta |
| AR | Aortic Regurg |
| Asc | Ascending |
| ASD | Atrial Septal Defect |
| AV | Aortic Valve |
| AV Cusp | Aortic Valve Cusp Separation |
| AVA | Aortic Valve Area |
| AV-A | Aortic Valve Area by Continuity Equation |
| BSA | Body Surface Area |
| CI | Cardiac Index |
| CO | Cardiac Output |
| d | Diastolic |
| D | Diameter |
| Dec | Deceleration |
| DecT | Deceleration Time |
| Desc | Descending |
| Dur | Duration |
| EdV | End Diastolic Volume |
| EF | Ejection Fraction |
| EPSS | E-Point-to-Septum Separation |

Table 10-1: Cardiology Abbreviations (Continued)

| Acronym | Name |
|---|---|
| EsV | End Systolic Volume |
| ET | Ejection Time |
| FS | Fractional Shortening |
| FV | Flow Volume |
| FVI | Flow Velocity Integral |
| HR | Heart Rate |
| IVRT | IsoVolumetric Relaxation Time |
| IVS | Interventricular Septum |
| L | Length |
| LA | Left Atrium |
| LAA | Left Atrium Area |
| LAD | Left Atrium Diameter |
| LPA | Left Pulmonary Artery |
| LV | Left Ventricle |
| LVA | Left Ventricular Area |
| LVID | Left Ventricle Internal Diameter |
| LVL | Left Ventricle Length |
| LVM | Left Ventricular Mass |
| LVPW | Left Ventricle Posterior Wall |
| ML | Medial to Lateral |
| MPA | Main Pulmonary Artery |
| MR | Mitral Regurgitation |
| MV | Mitral Valve |
| MVcf | Mean Velocity Circumferential Fiber Shortening |
| MVO | Mitral Valve Orifice |
| OT | Outflow Tract |
| P | Papillary Muscles |
| PA | Pulmonary Artery |
| PAP | Pulmonary Artery Pressure |
| PDA | Patent Ductus Arterosis |

Table 10-1: Cardiology Abbreviations (Continued)

| Acronym | Name |
|---|---|
| PEP | Pre-Ejection Period |
| PFO | Patent Foramen Ovale |
| PG | Pressure Gradient |
| PHT | Pressure Half Time |
| PI | Pulmonary Insufficiency |
| PISA | Proximal Isovelocity Surface Area |
| PR | Pulmonic Regurgitation |
| PV | Pulmonic Valve |
| PV-A | Pulmonic Valve Area by Continuity Equation |
| PVein | Pulmonary Vein |
| PW | Posterior Wall |
| Qp | Pulmonic Flow or CO |
| Qs | Systemic Flow or CO |
| RA | Right Atrium |
| RAA | Right Atrium Area |
| Rad | Radius |
| RAD | Right Atrium Diameter |
| RPA | Right Pulmonary Artery |
| RV | Right Ventricle |
| RVA | Right Ventricle Area |
| RVAW | RIght Ventricle Anterior Wall |
| RVD | Right Ventricle Diameter |
| RVID | Right Ventricle Internal Diameter |
| RVL | Right Ventricle LEngth |
| RVOT | Right Ventricle Outflow Tract |
| s | Systolic |
| SI | Stroke Index |
| ST | Shortening |
| SV | Stroke Volume |
| SVI | Stroke Volume Index |

Table 10-1: Cardiology Abbreviations (Continued)

| Acronym | Name |
|---|---|
| T | Time |
| TA | Tricuspid Annulus |
| TAML | Tricuspid Annulus Medial to Lateral |
| TR | Tricuspid Regurgitation |
| TV | Tricuspid Valve |
| TVA | Tricuspid Valve Area |
| Vcf | Velocity Circumferential Fiber Shortening |
| Vel | Velocity |
| VET | Valve Ejection Time |
| Vmax | Maximum Velocity |
| Vmean | Mean Velocity |
| VSD | Ventricular Septal Defect |
| VTI | Velocity Time Integral |

In this manual, the abbreviation for each measurement is listed in parenthesis after the measurement, as follows:

- Aortic Root Diameter (***Ao Diam***)
- Left Ventricle Posterior Wall Thickness, Diastolic (***LVPWd***)

For example, to measure the Aortic Root Diameter, you select ***Ao Diam*** on the touch panel.

## Cardiac Measurements

This section lists cardiac measurements and the steps to perform them. The measurement information in this section is organized by mode, then by region of interest, and then by type of measurement. The organization is as follows:

- Mode; there is a section for B-Mode, M-Mode, Color Flow Mode, and Doppler Mode. There is also a Combination Mode section, which includes calculations that are a result of measurements made in more than one mode.
- Within each mode section, there are sections for region of interest, such as aorta or mitral valve.
- Within each region of interest section, there are sections for type of measurement, such a one distance, two distance, trace, or velocity flow trace. Each measurement type section lists all cardiac measurements that are that type, and then describes the steps to perform that type of measurement.

Some measurements, such as Aortic Root Diameter or Aortic Valve Cusp Separation, can be made in B-Mode or M-Mode. The information for these measurements is included in both B-Mode and M-Mode sections.

*NOTE: You can select the diastole frame/systole frame (ED/ES or ES/ED) with the assigned touch panel control.*

## Steps to perform a measurement

### Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

### Making two distance measurements

1. Select the measurement; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

## Steps to perform a measurement (continued)

### Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

### Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

## Steps to perform a measurement (continued)

### Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

### Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

## Steps to perform a measurement (continued)

### Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

### Making a time interval/slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the time interval and slope measurements in the Results Window.

## B-Mode Measurements

### Aorta

#### One distance measurements

- Aortic Root Diameter (***Ao Diam***)
- Aortic Arch Diameter (***Ao Arch Diam***)
- Ascending Aortic Diameter (***Ao Asc Diam***)
- Aorta Annulus Diameter (***Ao Annulus Diam***)
- Aorta Isthmus (***Ao Isthmus***)
- Aorta ST Junction (***Ao st junct***)

### Aortic Valve

#### One distance measurements

- Aortic Diameter (***Ao Diam***)
- Aortic Valve Cusp Separation (***AV Cusp***)
- Aortic Valve Diameter (***AV Diam***)

#### One trace measurements

- Aortic Valve Area Planimetry (***AVA Planimetry***)
- Transverse Aortic Valve Area (***Trans AVA(d), Trans AVA(s)***)

## Left Atrium

**Two distance measurements**

- Left Atrium Diameter to Ao Root Diameter Ratio (***LA/Ao Ratio***)

**One distance measurement**

- Left Atrium Diameter (***LA Diam***)
- Left Atrium Length (***LA Major***)
- Left Atrium Width (***LA Minor***)

**One trace measurements**

- Left Atrium Area
  - Diastolic (***LAA (d)***)
  - Systolic (***LAA (s)***)

**One trace measurement and one distance measurement**

- Left Atrium Volume, Single Plane, Method of Disk
  - Diastolic (***LAEDV A2C***) (***LAEDV A4C***)
  - Systolic (***LAESV A2C***) (***LAESV A4C***)

## Left Ventricle

*NOTE: The user can select the Straight/Line (polygonal line) with the LV study tool. Adjust the appropriate touch panel control to make the selection.*

### One distance measurements

- Left Ventricle Mass Index
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)
- Left Ventricle Volume, Teichholz
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Length
  - Diastolic (***LVLd***)
  - Systolic (***LVLs***)
- Left Ventricle Outflow Tract Diameter (***LVOT Diam***)
- Left Ventricle Posterior Wall Thickness
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)
- Left Ventricle Length (***LV Major***)
- Left Ventricle Width (***LV Minor***)

## Left Ventricle (continued)

### One trace measurements

- Left Ventricle Outflow Tract Area (***LVOT Diam***)
- Left Ventricle Area, Two Chamber
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Area, Four Chamber
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Area, Short Axis
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Endocardial Area, Width (***LVA (d)***)
- Left Ventricle Epicardial Area, Length
  - Diastolic (***LVAepi (d)***)
  - Systolic (***LVAepi (s)***)

### One time interval measurements

- Heart Rate, Teichholz
- Heart Rate for Two Chamber study
- Heart Rate for Four Chamber study
- Heart Rate for Two Chamber Area-Length study
- Heart Rate for Two Chamber Method of Disk study
- Heart Rate for Four Chamber Area-Length study
- Heart Rate for Four Chamber Method of Disk study
- Heart Rate for Bi-Plane Method of Disk study

## Left Ventricle (continued)

### Two distance measurements

- Ejection Fraction, Teichholz (***LVIDs***)
- Ejection Fraction, Cubic (***LVIDs***)
- Left Ventricle Posterior Wall Fractional Shortening (***LVPWs***)
- Left Ventricle Stroke Index, Teichholz (***LVIDs***, and Body Surface Area)
- Left Ventricle Fractional Shortening (***LVIDs***)
- Left Ventricle Stroke Volume, Teichholz (***LVIDs***)
- Left Ventricle Stroke Volume, Cubic (***LVIDs***)

### Body surface area and stroke volume measurements

- Left Ventricle Stroke Index, Single Plane, Two Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Single Plane, Four Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Bi-Plane, Bullet
- Left Ventricle Stroke Index, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***)

  The system calculates body surface area from the patient's height and weight.

### Left Ventricle Study

- Diastolic (***LVd***)
- Systolic (***LVs***)

  The Left Ventricle study automatically sequences the following measurements:

  - Interventricular Septum (***IVSd***, ***IVSs***)
  - Left Ventricle Internal Diameter (***LVIDs***, ***LVIDd***)
  - Left Ventricle Posterior Wall Thickness (***LVPWs***, ***LVPWd***)

## Mitral Valve

### One distance measurements

- Mitral Valve Annulus Diameter (***MV Ann Diam***)
- E-Point-to-Septum Separation (***EPSS***)

### One trace measurement

- Mitral Valve Area by Pressure Half Time (***MVA By PHT***)
- Mitral Valve Area Planimetry (***MVA Planimetry***)

## Pulmonic Valve

### One distance measurement

- Pulmonic Valve Annulus Diameter (***PV Ann Diam***)
- Pulmonic Diameter (***Pulmonic Diam***)

## Right Atrium

### One distance measurement

- Right Atrium Diameter, Length (***RA Major***)
- Right Atrium Diameter, Width (***RA Minor***)

### One trace measurements

- Right Atrium Area (***RA Area***)
- Right Atrium Volume, SIngle Plane, Method of Disk (***RAAd***)
- Right Atrium Volume, Systolic, SIngle Plane, Method of Disk (***RAAs***)

## Right Ventricle

### One trace measurement

- Left Pulmonary Artery Area (***LPA Area***)
- Right Pulmonary Artery Area (***RPA Area***)

### One distance measurements

- Right Ventricle Internal Diameter
  - Diastolic (***RVIDd***)
  - Systolic (***RVIDs***)
- Right Ventricle Diameter, Length (***RV Major***)
- Right Ventricle Diameter, Width (***RV Minor***)
- Right Ventricle Wall Thickness
  - Diastolic (***RVAWd***)
  - Systolic (***RVAWs***)
- Right Ventricle Outflow Tract Diameter (***RVOT Diam***)
- Left Pulmonary Artery (***LPA***)
- Main Pulmonary Artery (***MPA***)
- Right Pulmonary Artery (***RPA***)

## System

### One distance measurements

- Interventricular Septum Thickness
  - Diastolic (***IVSd***)
  - Systolic (***IVSs***)
- Inferior Vena Cava (***IVC***)
- Main Pulmonary Artery Diameter (***MPA Diam***)
- Systemic Vein Diameter (***Systemic Diam***)
- Patent Ductus Arterosis Diameter (***PDA Diam***)
- Patent Foramen Ovale Diameter (***PFO Diam***)
- Pericardial Effusion Diastole (***PEd***)
- Ventricular Septal Defect Diameter (***VSD Diam***)
- Atrial Septal Defect Diameter (***ASD Diam***)

### Body surface area and stroke volume measurements

- Interventricular Septum (IVS) systole (***IVSs***)

  The system calculates body surface area from the patient's height and weight.

## Tricuspid Valve

### One distance measurements

- Tricuspid Valve Annulus Diameter (***TV Ann Diam***)
- Tricuspid Valve Area (***TV Area***)

## M-Mode Measurements

### Aorta

**One distance measurement**

- Aortic Root Diameter (***Ao Root Diam***)

### Aortic Valve

**One distance measurements**

- Aortic Valve Cusp Separation (***AV Cusp***)

### Left Atrium

**One distance measurement**

- Left Atrium Diameter (***LA Diam***)

**Two distance measurement (ratio)**

- Left Atrium Diameter to Ao Root Diameter Ratio (***LA/Ao***)

## Left Ventricle

### One distance measurements

- Left Ventricle Volume, Teichholz
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Posterior Wall Thickness
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)

### One time interval measurement

- Heart Rate ***(R-R)***
- Left Ventricle Ejection Time (***LVET***)
- Left Ventricle Pre-Ejection Period (***LVPEP***)
- Velocity Circumferential Fiber Shortening (***Vcf***)

### Left Ventricle Study

The Left Ventricle study (***LV Study***) automatically sequences the following measurements:

- Interventricular Septum (***IVSd, IVSs***)
- Left Ventricle Internal Diameter (***LVIDd, LVIDs***)
- Left Ventricle Posterior Wall Thickness (***LVPWd, LVPWs***)

## Mitral Valve

### One distance measurements

- E-Point-to-Septum Separation (***EPSS***)

### One slope measurements

- Mitral Valve Anterior Leaflet Excursion (***D-E Excursion***)
- Mitral Valve D-E Slope (***D-E Slope***)
- Mitral Valve E-F Slope (***E-F Slope***)

## Right Ventricle

### One distance measurements

- Right Ventricle Internal Diameter
  - Diastolic (***RVIDd***)
  - Systolic (***RVIDs***)
- Right Ventricle Wall Thickness
  - Diastolic (***RVAWd***)
  - Systolic (***RVAWs***)

### One time interval measurements

- Right Ventricle Ejection Time (***RVET***)
- Right Ventricle Pre-Ejection Period (***RVPEP***)

### Right Ventricle Study

The Right Ventricle study (***RV study***) automatically sequences the following measurements:

- Right Ventricle Internal Diameter (RVIDd, RVIDs))

## Pulmonic Valve

### One time interval measurements

- QRS complex to end of envelope (***Q-to-PV close***)

## System

### One distance measurements

- Interventricular Septum
  - Diastolic (***IVSd***)
  - Systolic (***IVSs***)
- Pericardial Effusion (***PE(d)***)

### Two distance measurement

- Interventricular Septum (IVS) Fractional Shortening (***LVD - LVS / LVD x 100***)

## Tricuspid Valve

### One time interval measurements

- QRS complex to end of envelope (***Q-to-TV close***)

## Doppler Mode Measurements

### Aortic Valve

#### Velocity flow trace measurements

- Aortic Insufficiency Mean Pressure Gradient (***AI Trace***)
- Aortic Insufficiency Peak Pressure Gradient (***AI Vmax***)
- Aortic Insufficiency Mean Velocity (***AI Trace***)
- Aortic Insufficiency Mean Square Root Velocity (***AI Trace***)
- Aortic Insufficiency Velocity Time Integral (***AI Trace***)
- Aortic Valve Mean Velocity (***AV Trace***)
- Aortic Valve Mean Square Root Velocity (***AV Trace***)
- Aortic Valve Velocity Time Integral (***AV Trace***)
- Aortic Valve Mean Pressure Gradient (***AV Trace***)

#### One peak velocity measurements

- Aortic Valve Peak Pressure Gradient (***AR Vmax***)
- Aortic Insufficiency Peak Velocity (***AR Vmax/AI Vmax***)
- Aortic Insufficiency End-Diastolic Velocity (***ARend Vmax/ AIend Vmax***)
- Aortic Valve Peak Velocity (***AV Vmax***)
- Aortic Valve Peak Velocity at Point E (***AV Vmax***)
- Aorta Proximal Coarctation (***Coarc Pre-Duct***)
- Aorta Distal Coarctation (***Coarc Post-Duct***)

#### One slope measurements

- Aortic Valve Insufficiency Pressure Half Time (***AR PHT***)
- Aortic Valve Flow Acceleration (***AV Trace***)
- Aortic Valve Pressure Half Time (***AV Trace***)

## Aortic Valve (continued)

### One time interval measurements

- Aortic Valve Acceleration Time (***AV AccT***)
- Aortic Valve Deceleration TIme (***AI PHT***)
- Aortic Valve Ejection Time (***AVET***)
- Aortic Valve Heart Rate
- Time

### Two time interval measurement

Slope through aortic valve trace:

- Aortic Valve Acceleration to Ejection Time Ratio (***AVET***)
- Aortic Valve Area according to PHT

## Left Ventricle

**One peak velocity measurements**

- Left Ventricle Outflow Tract Peak Pressure Gradient (***LVOT maxPG***)
- Left Ventricle Outflow Tract Peak Velocity (***LVOT Vmax***)

**One velocity flow trace measurements**

- Left Ventricle Outflow Tract Mean Pressure Gradient (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Square Root Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Velocity Time Integral (***LVOT Trace***)

**One time interval measurements**

- Left Ventricle Heart Rate (***LVOT Trace***)
- Left Ventricle Ejection Time (***LVET***)

## Mitral Valve

*NOTE: When measuring the MV E/A velocity, Auto/Manual trace can be modified with the appropriate touch panel control.*

**One velocity flow trace measurements**

- Mitral Valve Regurgitant Flow Acceleration (***MV Trace***)
- Mitral Valve Regurgitant Mean Velocity (***MV Trace***)
- Mitral Regurgitant Mean Square Root Velocity (***MR Trace***)
- Mitral Regurgitant Mean Pressure Gradient (***MR Trace***)
- Mitral Regurgitant Velocity Time Integral (***MR Trace***)
- Mitral Valve Mean Velocity (***MV Trace***)
- Mitral Valve Mean Square Root Velocity (***MV Trace***)
- Mitral Valve Velocity Time Integral (***MV Trace***)
- Mitral Valve Mean Pressure Gradient (***MV Trace***)

**One peak velocity measurements**

- Mitral Regurgitant Peak Pressure Gradient (***MR Vmax***)
- Mitral Valve Peak Pressure Gradient (***MV Vmax***)
- Mitral Regurgitant Peak Velocity (***MR Vmax***)
- Mitral Valve Peak Velocity (***MV Vmax***)
- Mitral Valve Velocity Peak A (***MV A Velocity***)
- Mitral Valve Velocity Peak E (***MV E Velocity***)

**One slope measurements**

- Mitral Valve Area according to PHT (***MV PHT***)
- Mitral Valve Flow Deceleration (***MV DecT***)
- Mitral Valve Pressure Half Time (***MV PHT***)
- Mitral Valve Flow Acceleration (***MV AccT***)

## Mitral Valve (continued)

### Two distance measurement

- Mitral Valve E-Peak to A-Peak Ratio (A-C and D-E) (***MV E/A Ratio***)

### One time interval/slope measurements

- Mitral Valve Acceleration Time (***MV AccT***)
- Mitral Valve Deceleration Time (***MV DecT***)

### One time interval measurements

- Mitral Valve Ejection Time (***M VET***)
- Mitral Valve A-Wave Duration (***MV A Dur***)
- Mitral Valve Time to Peak (***MV TTP***)
- Time

### Two time interval measurement

Body surface area and stroke volume measurements:

- Stroke Volume Index by Mitral Flow (***MV Trace***)

  The system calculates body surface area from the patient's height and weight.

One distance and two velocity measurement:

- Mitral Valve Area from Continuity Equation (***MV Vmax***)

## Pulmonic Valve

### One peak velocity measurements

- Pulmonic Insufficiency Peak Pressure Gradient (***PI Vmax***)
- Pulmonic Insufficiency End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Valve Peak Pressure Gradient (***PV Vmax***)
- Pulmonic End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Insufficiency Peak Velocity (***PR Vmax***)
- Pulmonic Insufficiency End-Diastolic Velocity (***PRend Vmax***)
- Pulmonic Valve Peak Velocity (***PV Vmax***)
- Pulmonic End-Diastolic Velocity (***PV Trace***)

### One velocity flow trace measurements

- Pulmonary Artery Diastolic Pressure (***PV Trace***)
- Pulmonic Insufficiency Mean Pressure Gradient (***PR Trace***)
- Pulmonic Valve Mean Pressure Gradient (***PV Trace***)
- Pulmonic Insufficiency Mean Velocity (***PR Trace***)
- Pulmonic Insufficiency Mean Square Root Velocity (***PR Trace***)
- Pulmonic Insufficiency Velocity Time Integral (***PR Trace***)
- Pulmonic Valve Mean Velocity (***PV Trace***)
- Pulmonic Valve Mean Square Root Velocity (***PV Trace***)
- Pulmonic Valve Velocity Time Integral (***PV Trace***)

## Pulmonic Valve (continued)

### One slope measurements

- Pulmonic Insufficiency Pressure Half Time (***PR PHT***)
- Pulmonic Valve Flow Acceleration (***PV AccT***)

### One time interval measurements

- Pulmonic Valve Acceleration Time (***PV AccT***)
- Pulmonic Valve Ejection Time (***PVET***)
- Pulmonic Valve Pre-Ejection Period (***PVPEP***)
- QRS complex to end of envelope (***Q-to-PV close***)
- Time

### Two time intervals measurements

- Pulmonic Valve Acceleration to Ejection TIme Ratio (***PV AccT, PVET)***
- Pulmonic Valve Pre-Ejection to Ejection Time Ratio (***PVPEP***, ***PVET***)

## Right Ventricle

**One peak velocity measurements**

- Right Ventricle Outflow Tract Peak Pressure Gradient (***RVOT Vmax***)
- Right Ventricle Systolic Pressure (***RVOT Vmax***)
- Right Ventricle Outflow Tract Peak Velocity (***RVOT Vmax***)

**One velocity flow trace measurement**

- Right Ventricle Diastolic Pressure (***RVOT Trace***)
- Right Ventricle Outflow Tract Velocity Time Integral (***RVOT Trace***)

**One time interval measurement**

- Right Ventricle Ejection Time (***RVET***)

## System

**One peak velocity measurements**

- Pulmonary Artery Peak Velocity (***PV Vmax***)
- Pulmonary Vein Velocity Peak A (reverse) (***P Vein A***)
- Pulmonary Vein Peak Velocity
  - End-Diastolic (***P Vein D***)
  - Systolic (***P Vein S***)
- Systemic Vein Peak Velocity
  - End-Diastolic (***PDA Diastolic***)
  - Systolic (***PDA Systolic***)
- Ventricular Septal Defect Peak Velocity (***VSD Vmax***)
- Atrial Septal Defect Peak Velocity (***ASD Vmax***)

**One velocity flow trace measurements**

- Pulmonary Artery Velocity Time Integral (***Pulmonic VTI***)
- Systemic Vein Velocity Time Integral (***Systemic VTI***)

**One time interval measurements**

- Pulmonary Vein A-Wave Duration (***P Vein A Dur***)
- Time
- IsoVolumetric Relaxation Time (***IVRT***)
- IsoVolumetric Contraction Time (***IVCT***)

**Two peak velocity measurements**

- Pulmonary Vein S/D Ratio (***P Vein D, P Vein S***)
- Ventricular Septal Defect Peak Pressure Gradient (***VSD maxPG***)

Two velocity flow trace measurements:

- Pulmonic-to-Systemic Flow Ratio (***Qp/Qs***)

## Tricuspid Valve

### One peak velocity measurements

- Tricuspid Regurgitant Peak Pressure Gradient (***TR Vmax***)
- Tricuspid Valve Peak Pressure Gradient (***TV Vmax***)
- Tricuspid Regurgitant Peak Velocity (***TR Vmax***)
- Tricuspid Valve Peak Velocity (***TV Vmax***)
- Tricuspid Valve Velocity Peak A (***TV A Velocity***)
- Tricuspid Valve Velocity Peak E (***TV E Velocity***)

### One velocity flow trace measurements

- Tricuspid Regurgitant Mean Pressure Gradient (***TR Trace***)
- Tricuspid Regurgitant Mean Velocity (***TR Trace***)
- Tricuspid Regurgitant Mean Square Root Velocity (***TR Trace***)
- Tricuspid Regurgitant Velocity Time Integral (***TR Trace***)
- Tricuspid Valve Mean Pressure Gradient (***TV Trace***)
- Tricuspid Valve Mean Velocity (***TV Trace***)
- Tricuspid Valve Mean Square Root Velocity (***TV Trace***)
- Tricuspid Valve Velocity Time Integral (***TV Trace***)

### One time interval measurements

- Tricuspid Valve Time to Peak (***TV TTP***)
- Tricuspid Valve Closure to Opening (***TCO***)
- Tricuspid Valve A-Wave Duration (***TV A Dur***)
- QRS complex to end of envelope (***Q-to-TV close***)

## Tricuspid Valve (continued)

**One slope measurements**

- Tricuspid Valve Pressure Half Time (***TV PHT***)

**One velocity flow trace and one area measurement**

- Stroke Volume by Tricuspid Flow (***TV SV***)

**Two peak velocity measurement**

- Tricuspid Valve E-Peak to A-Peak Ratio (***TV E/A Velocity***)

## Color Flow Mode

### Aortic Valve

**One distance measurements**

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA AR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA AR***)

**One velocity flow trace measurements**

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA AR***)
- Proximal Isovelocity Surface Area: Regurgitant Volume Flow (***PISA AR***)

**One peak velocity measurement**

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA AR***)

### Mitral Valve

**One distance measurements**

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA MR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA MR***)

**One velocity flow trace measurements**

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA MR***)

**One peak velocity measurement**

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA MR***)

## Cardiac Worksheet

After you make cardiac measurements, you can review all the data on the cardiac worksheet. To view the worksheet, select the ***Worksheet*** key on the touch panel.

The cardiac worksheet has a heading for each mode, and for each folder. In Figure 10-2, the mode heading is 2D Measurements, followed by Cube/Teichholz. Each measurement from that folder is listed next. The next folder is then listed, in this example, RV/LV.

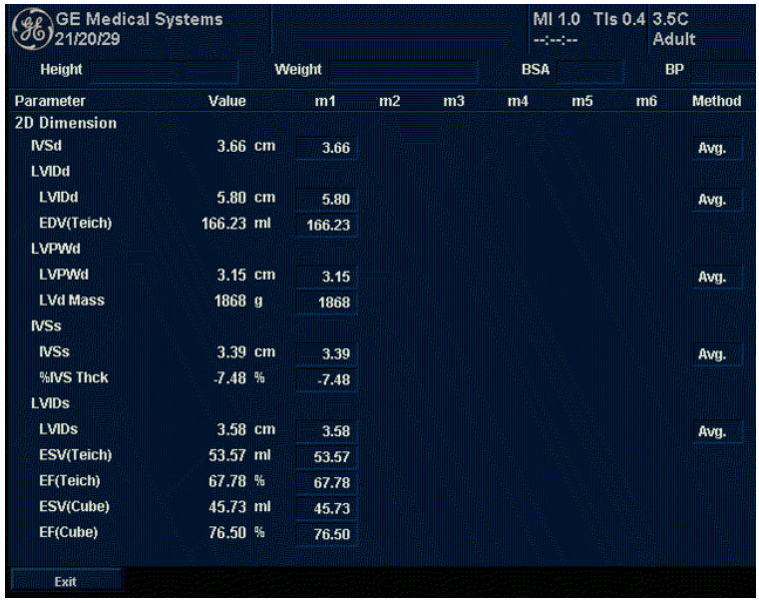



Figure 10-2. Cardiac Worksheet: Page 1

If a worksheet has more data on a second page, to view the next page, select **Page Change**.

To return to scanning, select the ***Worksheet*** or press ***Esc***.

## Worksheet information

The information on the cardiac worksheet is as follows:

- Parameter – This column lists the mode, the measurement folder, and the specific measurement.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1–mN – All measurement values for each item. If you make more than six measurements, the worksheet has a scroll bar to show all values (cardiac worksheet only).
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, or last. To change the method:

  a. Move the **Trackball** to the Method field.

  b. Press **Set**.

  c. Move the **Trackball** to select from the list.

  d. Press **Set**.

For more information about working with worksheets, see ‘Viewing and Editing Worksheets’ on *page 7-77* for more information.

## Setting up and Organizing Measurements and Calculations

When you receive your LOGIQ S7 Expert/Pro system, the studies and measurements are organized for typical work flows. If you want, you can change this set up. You can change studies, create studies, and specify which measurements and calculations are in each study. You can change the measurements that are available on the touch panel. The LOGIQ S7 Expert/Pro allows you to quickly and easily set up your system so that you can work most efficiently.

For information about how to customize studies and measurements, see ‘Measurement and Calculation Setup’ on *page 7-16* for more information.

When you make cardiac measurements, the results you see in the Results Window and the Worksheet can vary, depending on what you have set up in the Utility screens.

## Generic Study

The Cardiology B Mode Generic exam category includes the following measurements:

- Area (Trace)
- Volume
- Volume (d)
- Volume (s)
- Dist (Distance) Ratio
- Area Ratio
- R-R

The Cardiology M Mode Generic exam category includes the following measurements:

- LV Study
- LA/Ao
- RV Study
- D-E Excursion
- Slope Caliper
- Caliper
- Time
- HR
- Dd/Ds Study

The Cardiology Doppler Mode Generic exam category includes the following measurements:

- Point
- Manual Trace
- MV E/A Ratio
- PHT
- Time
- HR

## Cardiac Doppler Measurements

### E/e' Ratio

The ratio of early transmitral velocity to early diastolic velocity of the mitral annulus (E/e') is measured in Doppler Mode and TVD mode.

1. First, measure MV E/A Velocity to get "E".
2. Measure e'.

*NOTE: The system displays "e" in place of "e'" on the touch panel.*

3. The system calculates E/e' ratio automatically.

# Stress Echo

## Introduction

The LOGIQ S7 Expert/Pro Ultrasound system provides an integrated stress echo package, with the ability to perform image acquisition, review, image optimization, and wall segment scoring and reporting for a complete, efficient stress echo examination.

The stress package provides a protocol template for the two types of stress exams (exercise and pharmacological stress).

In addition to preset factory protocol templates, templates can be created or modified to suit your needs.

You can define various quad screen review groups, in any order and combination, that will suit your normal review protocol.

When reviewing stress examination images, the images are viewed at their original image quality, and different post-processing and zoom factors may be applied to the images under review for effective image optimization.

The protocol template may be configured for Continuous Capture.

A stress echo examination consists of three steps:

- Selection of a stress test protocol template
- Image acquisition
- Stress Analysis

*NOTE: If WallMotion Segment Score is not displayed on the screen, select the "WallMotion" preset in the Utility -> Measure -> M&A -> Plot -> Available Folders and Measurements.*

## Getting started with a stress study

1. After selecting the appropriate application and probe, press the ***Protocol*** tab on the touch panel. The protocol screen displays the layout of the default stress protocol for the current probe. This layout is also known as a template.

Figure 10-3. Protocol Tab

Table 10-2: Protocol Tab

| Parameter | Description |
|---|---|
| Analyze | Display the Analysis screen |
| Template Editor | Display the template editor screen |
| Add Level | Add Level to the template |
| Delete Images | Delete the selected image |
| Move Image | Move the selected image to the another cell |
| Sync. Select | Synchronize the selected images. |
| End CC | End Continuous Capture |
| Begin/Cont. | Begin or continue the acquisition |
| Template | Display the template list |
| T1 | Display/Hide the timer T1 |
| T2 | Display/Hide the timer T2 |
| Cancel | Cancel Stress Echo |

## Getting started with a stress study (continued)

2. To use the current template, press ***Begin/Cont.*** to initiate scanning.

   To use another template, press ***Template***. The template list displays.

Figure 10-4. Template List

3. **Trackball** to the desired template and press **Set**.

## Getting started with a stress study (continued)

4. The selected template displays.

Figure 10-5. Template (Example)

a. Level
b. Projection
c. Current Acquisition (green)

5. Press ***Begin/Cont.*** to initiate scanning using the new template.

## Image acquisition

Images are acquired in a pre-defined order, according to the selected template. The highlighted (green) cell of the template matrix, displayed in the Clipboard window, indicates which view is currently being acquired.

The names of the view and levels for the current cell are displayed on the top left corner of the image area and under the template matrix.

Acquisition Screen

1. Current View Level
2. Timer
3. Template Matrix
4. Current View (Green cell)

## Starting acquisition

1. Select the template.
2. Press ***Begin/Cont.***
3. Perform a scan that conforms with the view that is highlighted in the template matrix on the Clipboard window.
4. Press the **P1** (Image Store) key.
   - If the actual stress level is configured to preview the cine loop before storing, use the cine loop controls to select the most appropriate heart cycle and if desired adjust the loop markers. Press **P1** again to save the selected cine loop.

     or

     If you do not want to store the cine loop, press **Freeze** to cancel. Return to the scan screen.
   - If the actual stress level is not configured to preview the cine loop before storing, the system automatically stores the last heart cycle.

   Stress levels can be configured for side-by-side display/ comparison of the reference loop from baseline or previous level and the loop to acquire.
5. After storing the cine loop, the system automatically highlights the next view in the matrix to be acquired.
6. Repeat previous steps until all required views are completed.
7. If you select Auto Start Analysis on the Template Editor for this template, a dialogue asking “Do you want to start protocol analysis now?” displays when the last acquisition is complete. If you select Yes, the Stress Echo Analysis screen is displayed.

   The template used can be configured so that analysis automatically starts by displaying the first protocol group. The wall segment scoring diagrams for each view is displayed in the Parameter window on the left side of the screen.

## Starting acquisition (continued)

If the ***Protocol*** tab is selected during acquisiton, the following touch panel displays.

Figure 10-6. Protocol Tab during acquisition

Table 10-3: Protocol Tab during acquisition

| Parameter | Description |
|---|---|
| Stop | Stop Stress Echo. |
| Pause | Pause Stress Echo. The template matrix continues in display. Even if you press P1, the cine loop does not store to the matrix. |
| Select Cycles | The Continuous Capture Selection screen is displayed (only available in Continuous Capture mode). |
| Analyze | Enter Analysis screen. |
| Template | Enter Template screen. |
| Add Level | Add level to the template. |
| T2 | Display (Start)/Hide Timer T2. |

## Selecting a view during acquisition

A fixed protocol is provided for scanning, based on the selected template. The system automatically highlights the next view to be acquired in the template matrix, as images are stored. However, the order of scanning may be changed manually as follows:

### Manual selection of a view during acquisition

1. Use the **Trackball** or the ***arrow keys*** on the alphanumeric keyboard to move the cursor to the cell that represents the view to be acquired.

   The selected cell in the template matrix, highlighted in red, indicates the non-default position. When blinking, it contains a previously-stored acquisition.
2. Press ***Begin/Cont.*** to initiate scanning.
3. Scan and save the selected loop as explained in the previous section.

After storage, the system automatically highlights the next available view to be acquired.

## Moving an acquired image

An image can be moved from one cell to another during acquisition.

**Procedure 1**

1. When in the Protocol screen, press ***Move Image***.
2. Use the **Trackball** to move the cursor to the desired image.
3. Press **Set**.
4. Use the **Trackball** to move the cursor to the destination cell.
5. Press **Set**. The image is moved from the source cell to the destination cell.

**Procedure 2**

1. In the Protocol screen, use the **Trackball** to move the cursor to the cell containing the image to move (source cell).
2. Press and hold down **Set**.
3. With the **Set** key still depressed, move the **Trackball** to the desired cell.
4. Release the **Set** key. The image is moved from the source cell to the destination cell.

If the destination cell contains an image, the images from the source and destination cells is exchanged when moving an acquired image.

## Timers

Two timers can be displayed in the Stress mode acquisition screen, beside the template matrix.

Timers

- T1 displays the elapsed time from the start of stress examination.
- T2 starts when entering live scanning on the second stress level.

Both T1 and T2 timers can be manually stopped and restarted during the acquisition.

The display of T1 and T2 is user-configurable.

*NOTE: If you activate the Timer in Stress Echo, the T1 timer is displayed in the lower left-hand corner of the image area after exiting Stress Echo.*

## Continuous Capture mode

Continuous Capture mode enables the user to perform acquisition continuously for all views at any level depending on the selected template configuration. Continuous Capture consists of temporary saving images acquired in a storage buffer. To enable best possible use of the limited storage buffer capacity, a Pause/Capture mode is provided, as opposed to the normal Freeze/Scan mode. The Pause mode enables scanning and live display on the screen, without any capture, thereby leaving the buffer available.

To run Continuous Capture, the user has to select a template where this feature is activated.

### The buffer bar

When entering a level with Continuous Capture enabled, a buffer bar displays in the window.

The Buffer bar displays the following information:

- The scanning state
  - Pause (live scanning without storing)
  - Capture (live scanning with storing to buffer)
- The percentage of the buffer that is filled
- The buffer filling progression showed by a filling gage
- The capturing sessions, reflected by the red lines along the buffer bar

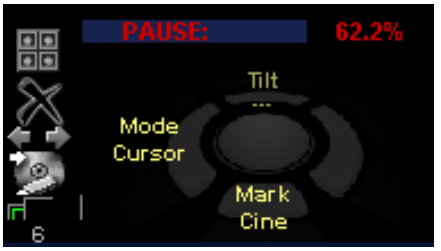



Figure 10-7. Buffer Bar

## Controlling the capture process

When entering a stress level with Continuous Capture enabled, the system is automatically set in Pause mode.

1. Press **P1** to start image capture.

   “Capture” is displayed in the buffer bar, the gage starts filling and the percentage of filled memory buffer increases.
2. Press P1 again to stop capture.

   “Pause” is displayed in the buffer bar.

When 90% of the memory buffer is filled up, the text display in the buffer bar turns red.

The system enters Freeze mode automatically once the buffer is full and the captured loops display in the Continuous Capture selection screen.

## Activating Continuous Capture

1. Do all your pre-stress acquisitions in the Cardiac application.
2. Press the ***Protocol*** tab to enter the Stress Echo mode. The Protocol screen displays.
3. Press ***Template***. The template list displays.
4. Select the template ***Exercise 2x4*** from the list.
5. Press ***Begin/Cont.***.
6. Acquire the resting loops in all four views.

*NOTE: Use the **P1** key to store the images.*

7. Once the fourth loop is acquired, the system enters into a waiting mode where Continuous Capture is in a pause state awaiting the patient to exercise.
8. When the patient is back on the bed, press **P1**. The Continuous Capture acquisition starts.
9. Acquire all your views.

   The memory buffer gage increases. When memory exceeds 90%, the percent number turns red.
10. Press **Freeze** to finish.

## Activating Continuous Capture (continued)

11. Press ***Select Cycle***.

    The Continuous Capture selection screen displays.

    If the buffer is full, the system automatically displays the Continuous Capture Selection screen.

    Refer to the next section if additional image acquisitions are necessary after the buffer is full.

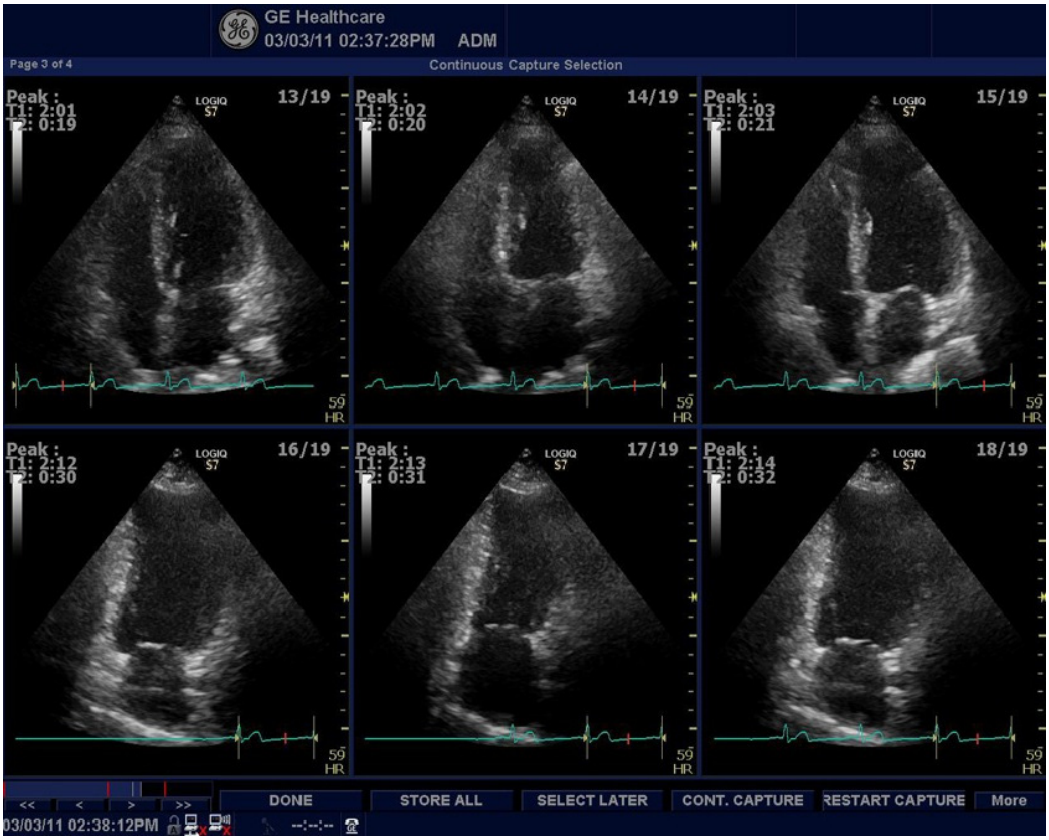



Figure 10-8. Continuous Capture Selection Screen

## Activating Continuous Capture (continued)

Figure 10-9. Select Cycles Touch Panel

## Activating Continuous Capture (continued)

12. Assign the cine loops to the four views.
    a. **Trackball** to the desired loop.
    b. Press **Set**. A drop-down menu appears with the available choices.
    c. **Trackball** to the appropriate view.
    d. Press **Set**.

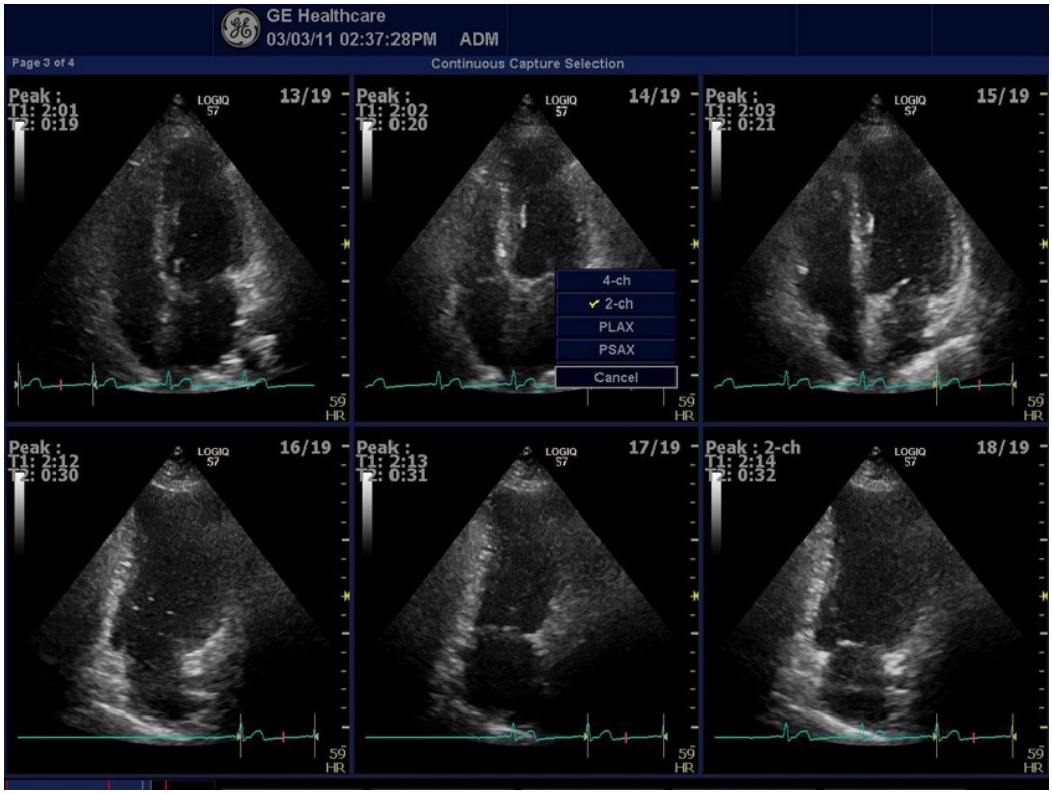



Figure 10-10. Drop-down Menu

e. Continue these steps until all views are selected.

*NOTE: To access additional cycles, use the arrow keys on the lower left portion of the select cycle screen.*

## Activating Continuous Capture (continued)

f. Select ***Done*** when complete. A dialogue window displays, asking whether the entire Continuous Capture acquisition should be saved.

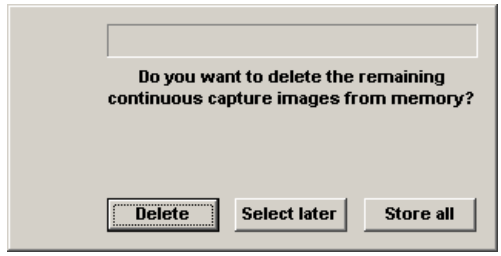



Figure 10-11. Dialogue Window

13. Press ***Delete*** to discard the loop or press ***Store*** to keep the entire loop.
14. Perform Analysis and scoring.

**Continuous Capture with additional image acquisition**

If the buffer is filled up before all the image acquisitions are done, additional loops can be stored in the clipboard before doing image assignment to the views.

1. Perform the Continuous Capture. See ‘Activating Continuous Capture’ on *page 10-53 for more information.* (Steps 1 to 11).
2. In the Continuous Capture selection screen, press ***Select Later***.

   The Continuous Capture screen displays.
3. Perform the additional acquisition.
4. In order to resume the stress echo exam and assign loops for the views from the Continuous Capture buffer, press ***Protocol***. If not displayed, select the template ***Exercise 2x4*** from the template list.
5. Click the continuous capture images on the Protocol Template screen.

   The Continuous Capture selection screen displays.
6. Assign the cine loops to the view. See ‘Activating Continuous Capture’ on *page 10-53 for more information.* (Step 12 a - f).
7. Press ***Delete*** to discard the loop or press ***Store all*** to keep the entire loop.

   The normal procedure is to discard the loop. The loop is very big and requires a lot of disk space.
8. Perform Analysis and Scoring.

**Postponed image assignment**

The assignment of the cine loops to the view can be done on a later stage on a stored Continuous Capture acquisition.

1. Perform the Continuous Capture. See ‘Activating Continuous Capture’ on *page 10-53 for more information.* (Steps 1 to 11).
2. Press ***Store all***.

   The entire Continuous Capture acquisition is stored. The examination can be ended and the image assignment, analysis and scoring can be done later.
3. Re-open the examination, if necessary.
4. Press ***Protocol***. The Protocol screen displays.
5. Click the continuous capture images on the Protocol Template screen.

   The Continuous Capture selection screen displays.
6. Assign the cine loops to the view. See ‘Activating Continuous Capture’ on *page 10-53 for more information.* (Step 12 a - f).
7. Select ***Done***.
8. Perform analysis and scoring.

**Restart capture from the Continuous Capture Selection**

- Press ***Restart Capture***.

  The recording in memory is deleted and the Continuous Capture starts again.

**Resume Continuous Capture**

- Press ***Continue Capture***.

  Resumes Continuous Capture recording (only if the Continuous Capture buffer is not full).

## Assiging and storing the cine loop

The cine loops captured in the buffer are assigned to the stress protocol views and stored from the Continuous Capture selection screen.

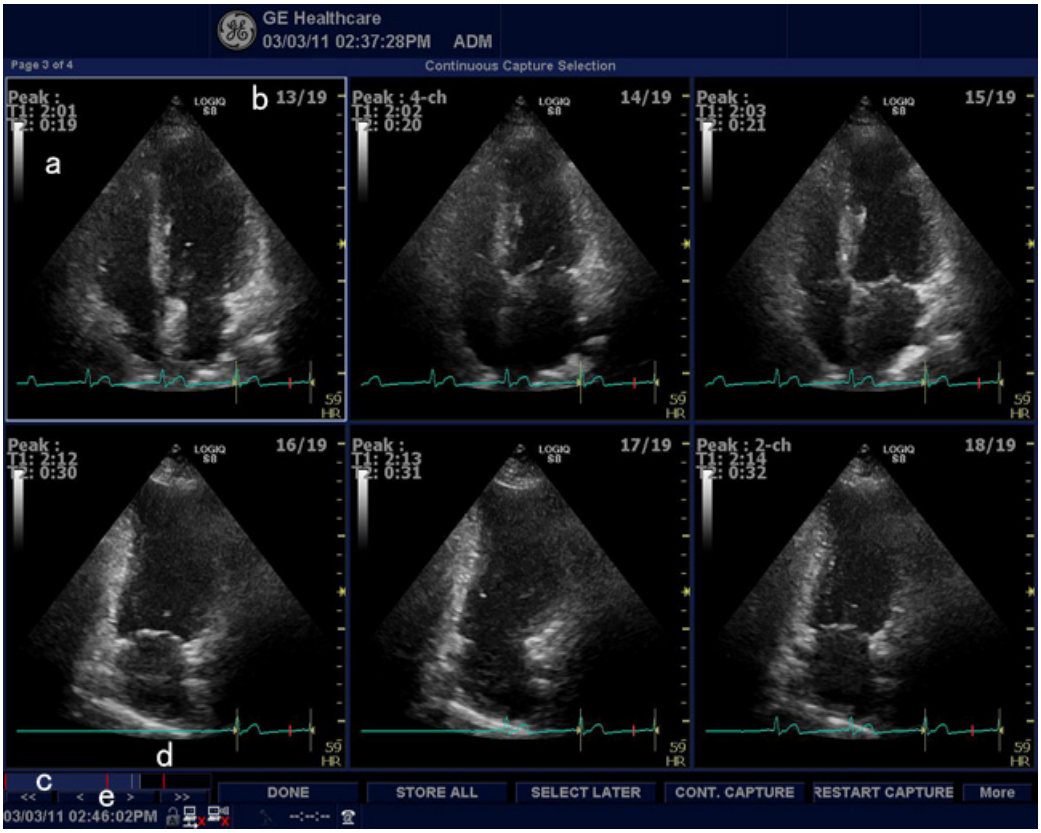



Figure 10-12. Continuous Capture Selection Screen

a. Highlighted loop
b. Cycle number and total number of cycles
c. Blue Gauge: Position of the highlighted loop within buffer area.
d. Red bar: Pause session.
e. Navigation Controls: << < > >> (back to first selection, back to previous selection, forward to next selection, and forward to final selection).

### Assigning a cine loop to a view

1. Use the **Trackball** to move the cursor to the desired cine loop in order to assign it to a particular view of the stress template.

   The frame of the loop is highlighted.

2. Press **Set**.

   A pop-up menu displays with the view names of the template.

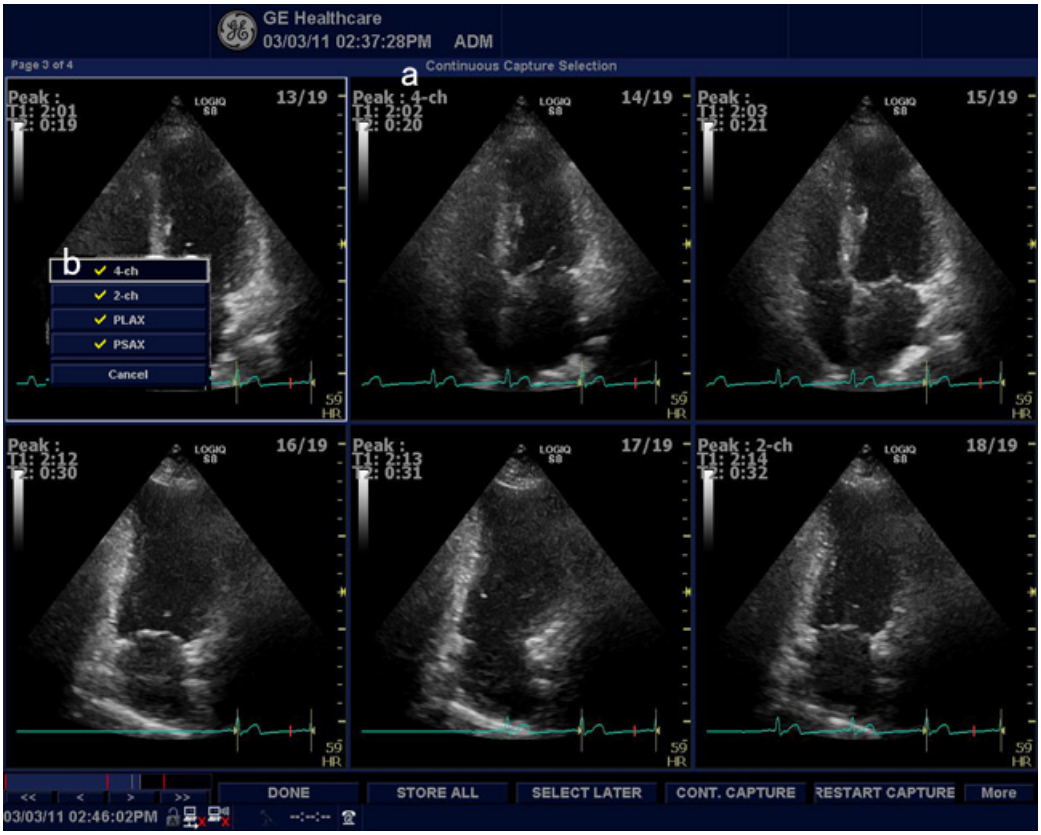



Figure 10-13. Loop Assignment

a. Already assigned view
b. Highlighted views

*NOTE: A checkmark appears on the Views pop-up after you have assigned a view to an image.*

**Assigning a cine loop to a view (continued)**

3. Use the **Trackball** to select the required view name.
4. Press **Set**.

   The name of the view displays above the timers in the window.
5. Repeat steps 1 through 4 to assign loops to the other views of the level.
6. Press ***Done*** when complete.

   A dialogue window displays asking whether the entire Continuous Capture acquisition should be saved.
7. Press ***Delete*** to discard the loop or press ***Store all*** to keep the entire loop.

   The normal procedure is to discard the loop. The loop is very big and requires a lot of disk space.

## Post Acquisition Features

Post acquisition, you can utilize Raw Data to adjust the following in B-Mode:

- Zoom
- SRI HD
- Rejection
- Frame Average
- TGC
- Maps
- Dynamic Range
- Gain
- Rotation

You can also take measurements post Stress Echo acquisition.

## Analysis

Analysis consists of viewing previously saved loops and assigning scores to each cardiac segment, in order to quantify the function of the muscle or wall segment.

Depending on the protocol configuration, the analysis stage can start manually or automatically after completion of the stress test. In this case, the usual procedure consists of sequentially opening all image groups (if defined) and performing scoring from image to image.

The quad screen is the standard display for comparing heart cycles. The heart cycle loops in the display are synchronized to enable comparison. Each loop in the quad screen can be magnified, using the zoom control.

### Image Selection for Analysis

Images can be selected manually or from a pre-defined group in the Protocol screen.

### Selection of Images from a group

If groups of images have been defined in the protocol template, you can select a group of images for analysis and sequentially analyze all images from all groups from within the Analysis screen.

1. In a stress examination, press ***Protocol***. A preview of the acquisition displays.
2. Press ***Analysis***. A pre-defined group appears in the display with a Wall Segment window on the left.
3. To advance to other groups, use the **Trackball** to move the cursor to the arrows at the bottom of the Wall Segment window. Select an arrow to advance to another group. For further clarification, see callout E in Figure 10-14.

**Manual selection of images from Analysis screen**

1. When currently in the protocol analysis screen in the Stress analysis quad screen, hold down the ***SHIFT*** key while performing Steps 2 through 4.
2. Use the **Trackball** to move the cursor to the first image to select in the template matrix.
3. Press **Set**. The frame of the selected loop is in the Stress analysis screen and the next window in the quad screen is automatically selected.
4. Repeat step 2 and 3 to select other images.
5. Depress ***SHIFT*** .

**Manual selection of images in the Protocol screen**

1. In a stress examination, press ***Protocol***. A preview of the acquisition displays.
2. Use the **Trackball** to move the cursor to the first image to select.
3. Press **Set**. The frame of the selected loop highlights.
4. Repeat Steps 2 and 3 to select other images.
5. Press ***Analyze*** to open images in the Analysis screen.

### Scoring acquired loops

1. After image selection, press ***Analyze***.
   The Stress Echo analyze screen displays.

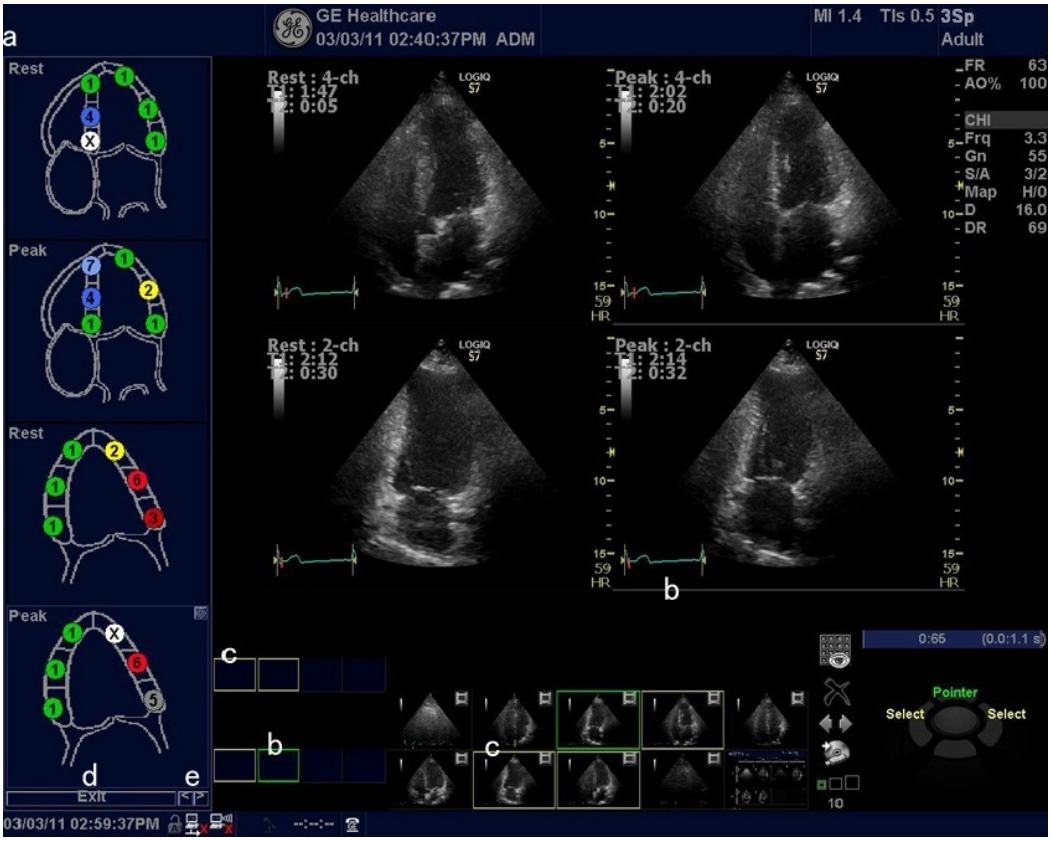



Figure 10-14. Analysis Screen

a. Wall segment diagram
b. Selected loop (Highlighted frame)
c. Displayed loops (Highlighted frames)
d. Exit Wall motion scoring
e. Change page or enter next image group

**Scoring acquired loops (continued)**

2. Use the **Trackball** to move the cursor to a segment in one of the scoring diagrams and press **Set**.

   The Score pop-up list displays.

3. Use the **Trackball** to move the cursor to a score.
4. Press **Set**.

   The score displays in the relevant segment area in the diagram.

*NOTE: To edit a score, select it and choose a new score.*

5. Repeat step 1 through 3 to score relevant segments.
6. Press the **Change Page** arrow to display the next group of images.
7. Repeat step 1 through 3 to score relevant segments on the new loops.

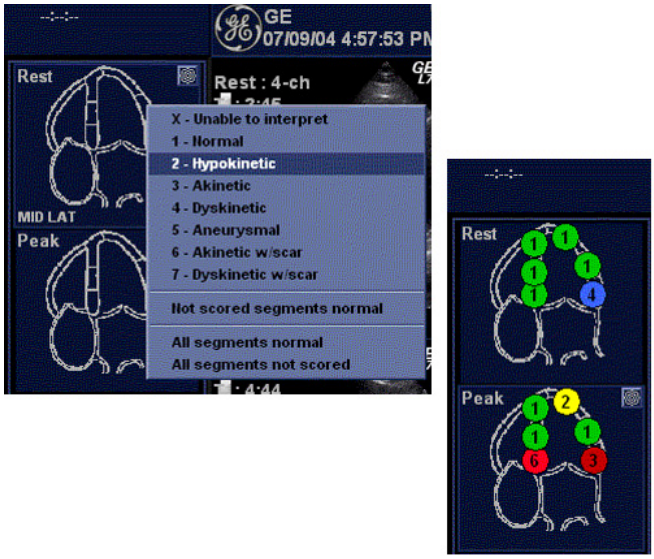



Figure 10-15. Segment Scoring

*NOTE: Since Cine changes into sync mode, subsequent scans are also synchronized. Exit sync mode from the Cine menu.*

## Editing/Creating template

The stress package provides protocol templates for exercise as well as pharmacological stress examinations.

The user can create new templates or modify existing templates to suit the individual needs. Up to ten projections and fourteen stress levels can be created in a template.

Templates created may be temporary, used only during the current examination, or saved as new templates, for future use and reference.

The editions that may be performed include:

- Adding/Deleting levels and projections.
- Assigning new labels to levels and projections.
- Defining level options.
- Defining new groups.

Templates are edited/created from the Template editor screen.

### Entering the Template editor screen

1. Press ***Protocol*** to enter the stress echo mode.
2. Press ***Template***.The template list displays.
3. Use the **Trackball** to select the Template Editor.
4. Press **Set**. The Template Editor screen displays.

OR

1. Press ***Protocol*** to enter the stress echo mode.
2. Press ***Template Editor*** on the Touch Panel. The Template Editor screen displays.

### Template Editor screen overview

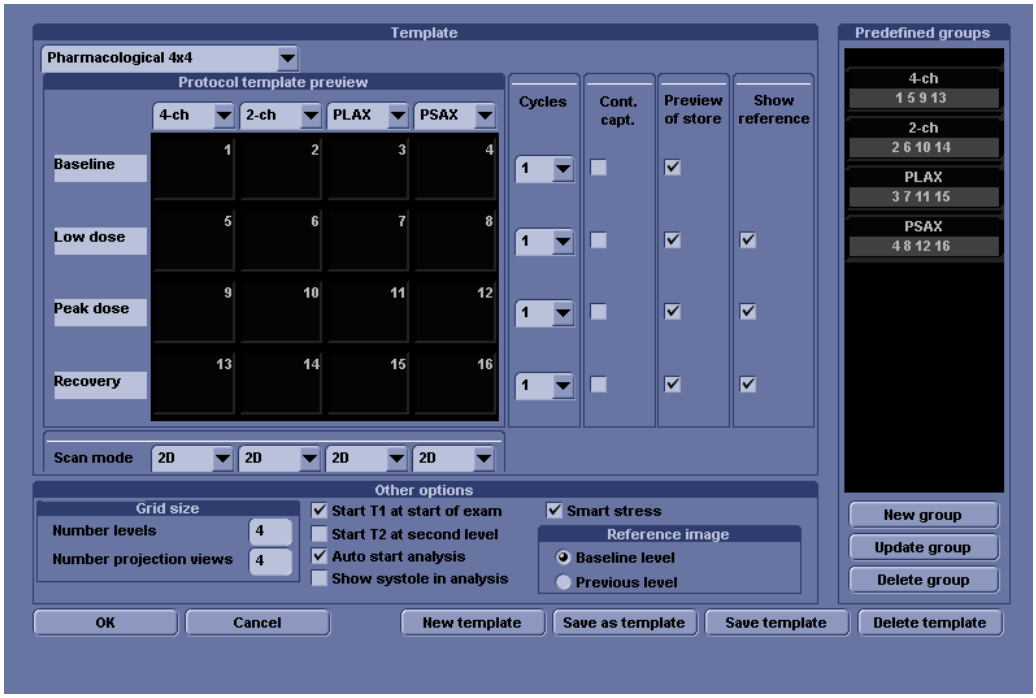



Figure 10-16. Template Editor Screen

Table 10-4: Template

| Parameter | Description |
|---|---|
| Template | Select a pre-defined template from the pull-down menu. The protocol template preview updates accordingly. |

Table 10-5: Protocol Template Preview

| Parameter | Description |
|---|---|
| Protocol Template Preview | • Displays an updated preview of the template accordingly to the settings applied.<br>• To change Projection and Stress level labels, select a pre-defined label from the pull-down menu or press **Set** in the actual label field and type a new name. |

Table 10-6: Template Settings

| Parameter | Description |
|---|---|
| Template Settings | • Cycles: select the number of cine loop heart cycles to store for each level from the pull-down menu or enter the desired value manually.<br>• Continuous Capture: Checking this parameter enables continuous image acquisition throughout the level. The images acquired are temporarily stored in the system's storage buffer.<br>• Preview of store: Checking this parameter enables review and adjustment of cine loops before store.<br>• Show reference: Checking this parameter displays a dual screen with the reference level (first or previous level) on the left and the live image on the right. |

Table 10-7: Scan Mode

| Parameter | Description |
|---|---|
| Scan Modes | • 2D, Color, PW (Pulsed Wave Doppler), CW (Continuous Wave Doppler), MM (M-Mode), Color MM, Color PW, Color CW |

Table 10-8: Other options

| Parameter | Description |
|---|---|
| Other Options | • Grid Size: Enter the number of levels and projections for the selected template.<br>• Timers: If you check this parameter, starts T1 and T2 timers automatically.<br>• Auto-start analysis: If you check this parameter, displays the Stress Echo Analysis when the last acquisition is performed.<br>• Show Systole in Analysis: When selected, the systolic part of the cardiac or ECG cycle is only displayed. The whole cycle is not displayed.<br>• Smart Stress: Check Smart Stress to store a subset of the image acquisition settings (e.g., Zoom, Gain, Compress, etc.) for each view in the protocol. Smart Stress enables you to set image acquisition settings for each view at a baseline level and automatically get the same image settings in the corresponding views in the next levels. Not available while in Continuous Capture.<br>• Reference image: When Show Reference is selected, selects either corresponding baseline loop or corresponding loop from the previous level to be displayed as reference image during acquisition. |

Table 10-9: Pre-defined groups

| Parameter | Description |
|---|---|
| Pre-defined groups | • Shows the image groups created.<br>• New group: Creates a new image group. Select the desired images on the template preview.<br>• Update group: Edits a selected group after new loop selection on the template preview.<br>• Delete group: Deletes a selected group. |

**Selecting a base template to edit**

1. Select the base template from the template pull-down menu on the upper left corner.
2. Press **Set**.

   The selected template displays in the protocol template preview field, showing the levels, projections and their labels.

**Adding/Deleting levels and projections**

1. Enter the number of levels and projections in the Grid size field.

   The new grid size displays in the protocol template preview field.
2. Press ***New Template*** to create a new template.

   or

   Press ***Save Template*** to update the base template.

**Display timers**

1. Check the box(es) to display timer(s) as specified.

*NOTE: The timers can also be started or stopped at any time during stress examination by using the T1 and T2 Touch panel key.*

**Start analysis automatically**

1. Check ***Auto Start Analysis*** to display the Stress Echo Analysis screen when the last acquisition is performed.

### Smart Stress

1. Check Smart Stress to store and automatically reuse a subset of the image acquisition settings in the baseline level view in the corresponding views in the next levels.

### Configuring levels

The following options can be set up for each level:

Number of cycles to be stored in the cine loop:

1. Enter the desired number (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20) in the Cycles field.

Continuous Capture

1. Check Continuous Capture if continuous image acquisition throughout the level is desired.

   When Continuous Capture is selected, preview of the cine loop and reference display during acquisition are not possible.

Preview of store

1. Check Preview of store if review and adjustment of cine loops before storage is desired.

Show reference

1. Check Show reference if the display of the corresponding reference loop is desired during acquisition (Dual screen mode).

**Adding a group**

1. In the Protocol template preview field, select the cells to be part of the group.
2. In the Pre-defined group field, press ***New group***.

   A dialogue box displays to ask the user to enter a name for the new group.
3. Enter the group name.
4. Press ***OK***. The new group displays in the pre-defined group field.

**Updating an existing group**

1. In the Pre-defined group field, select the group to edit.

   The selected cells are highlighted in the Protocol template preview field.

*NOTE: A selected group is highlighted by a blue frame.*

2. Either select a new cell(s) to add to the group or deselect an existing cell(s) to remove from the group.
3. Press ***Update group***.

   The display in the Protocol template preview field is updated accordingly.

**Deleting a group**

1. In the Pre-defined group field, select the group to delete.

*NOTE: The selected group is highlighted by a blue frame.*

2. Press ***Delete group***.

   The group is removed from the list in the pre-defined group field.

**Specifying Scan Mode for each Projection**

1. Specify the Scan Mode for each Projection: 2D (B-Mode), Color Flow Mode, M-Mode, Color M-Mode, PW Mode, Color PW Mode, CW Mode, or Color CW Mode.

### Saving the Template

You can save the template using controls at the bottom of the Template Editor page, or use the controls on the touch panel.

Figure 10-17. Template Editor Touch Panel

Table 10-10: Template Editor Saving Options

| Parameter | Value |
|---|---|
| New Template | Select this option to create an entirely new template. |
| Save As Template | If you would like to create a new template based on the existing template with your modifications, select to Save this Template As, and give it a name. |
| Save Template | Select this option to save the default template with your modifications. |
| Delete Template | Select this option to delete a template. |

### Wall Motion Segment Setup

You can set up the following parameters for Wall Motion Segment in the Utility screen (Utility--> Measure--> Advanced--> Cardiac).

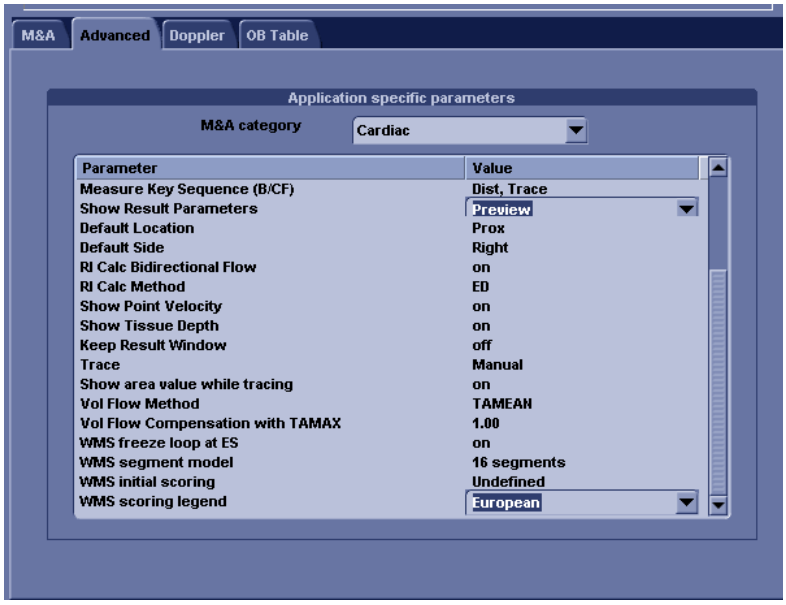



Figure 10-18. Cardiac Wall Motion Segment Setup

Table 10-11: Wall Motion Segment Parameters

| Parameter | Value |
|---|---|
| WMS freeze loop at ES | Specify to freeze the Loop at End Systole |
| WMS Segment Model | Select 16 or 18 segments |
| WMS initial scoring | Undefined or Normal |
| WMS scoring legend | ASE, ASIA or European |

### Utility Application Settings for Protocol

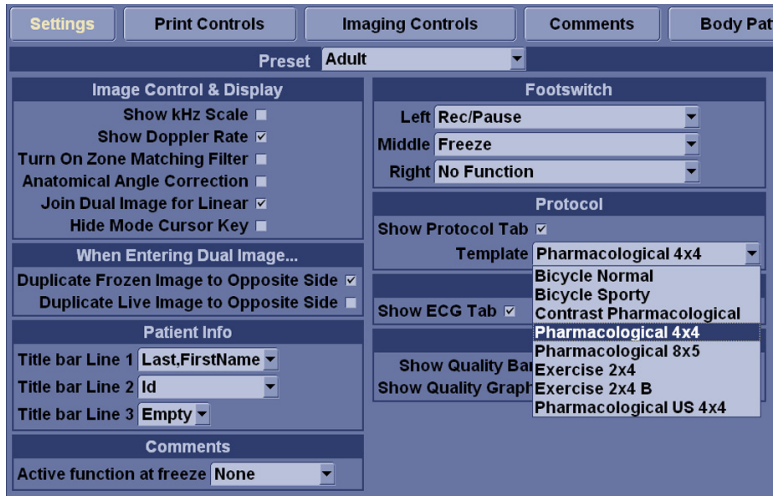



Figure 10-19. Protocol Setup

Table 10-12: Protocol Parameters

| Parameter | Description |
|---|---|
| Show Protocol Tab | Show/Hide the Protocol tab for that preset (Bicycle Normal, Bicycle Sporty, Contrast Pharmacological, Pharmacological 4x4, Pharmacological 8x5, Exercise 2x4, Exercise 2x4 B, Pharmacological US 4x4, or User-configured). |
| Template | Select the default template. |

**Report**

If you set up the Wall Motion Analysis field on the Report, you can insert the results. See ‘Cardiac Studies Wall Motion Analysis’ on *page 14-41 for more information.*

Select Report to view either the Bull’s Eye or Cut Plane Report.

Figure 10-20. Bull’s Eye Report Sample

**Report (continued)**

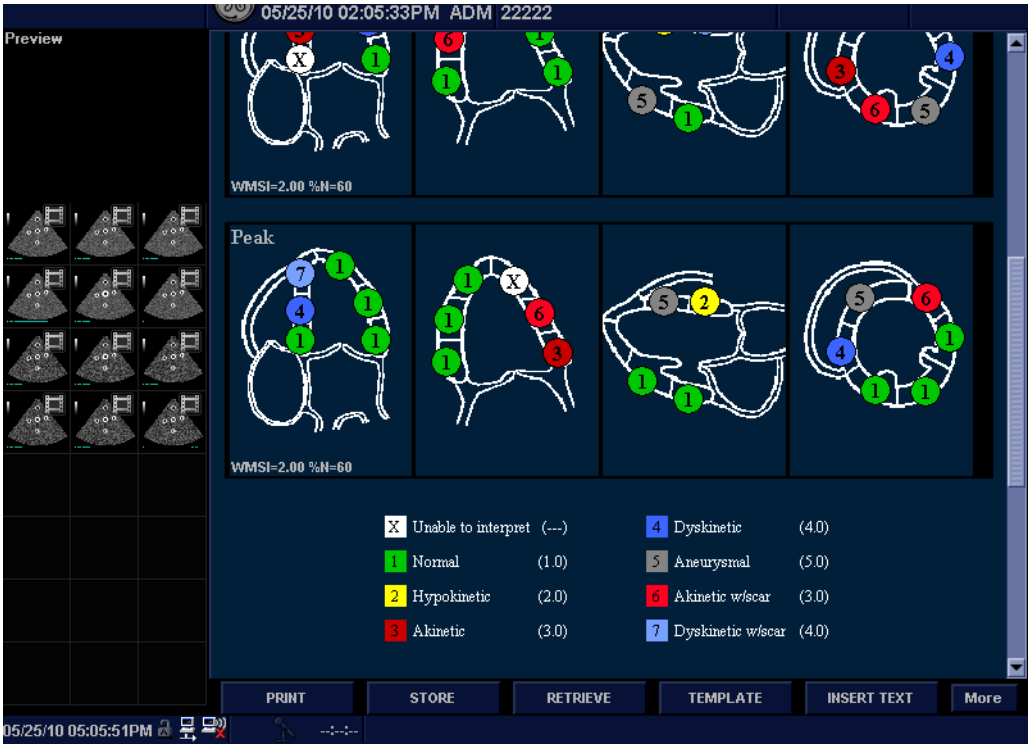
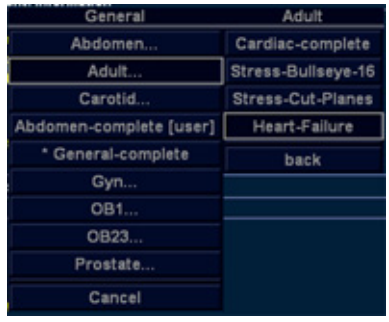



Figure 10-21. Cut Planes Report Example

HINTS

Select either Bull's Eye or Cut Plane on the Reports--> Adult Template.



# ECG (Option)

## Overview

WARNING

DO NOT USE the physiological traces of the LOGIQ S7 Expert/Pro Ultrasound system for diagnosis and monitoring.

CAUTION

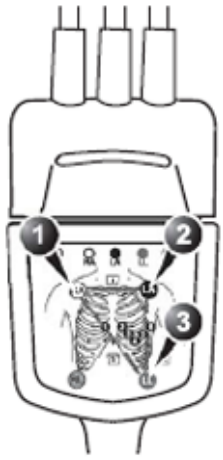
- ECG electrodes should not make contact with other conductive parts, including earth.
- After the defibrillator stimulates the patient, the ECG needs 4 to 5 seconds for recovery.
- The quality of the ECG trace depends on the stability and conductivity of the electrodes during the test, especially during high stages when the patient's movements can cause artifacts.
- Make sure that the lead wires do not swing.
- The device is not waterproof. Do not expose the device to water or any kind of liquid. Maintain in a dry place:
  - The exterior of the recorder may be wiped clean with a soft cloth. Do not use harsh cleaning agents to clean the unit. Do not immerse the unit in any liquid.
  - Clean the cables with a hospital approved cleaning procedure such as those recommended by AAMI or AORN. Do not immerse cables in water.
  - Worn or damaged patient cables are the most common cause of poor ECG signals. ECG signals (or wave patterns) that consistently contain noise or artifact may suggest need for ECG wire or cable replacement.
  - Store the device in a dry place.
  - Always protect the recorder from coming into contact with moisture. In rain or snow conditions, protect the recorder from bad weather elements by wearing the recorder inside a coat.

## ECG Cable

The ECG Cable is a modular cable consisting of two different cable parts:

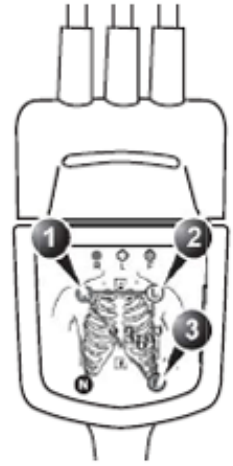
- Single cable with a system connection at one end and a cable splitter at the other.
- A triple color-coded electrode cable to be inserted into the splitter device. Each electrode cable hooks up to the appropriate stick-on electrode by a color-coded clip type connector.

The color-coding of the electrodes follows one of two standards that are common in different parts of the world. The cable splitter device has a drawing defining the color codes, names and body location for the two standard color codes.




AHA (USA)

1. RA: White
2. LA: Black
3. LL: Red




IEC (Europe, Asia, Rest of World)

1. R: Red
2. L: Yellow
3. F: Green

## ECG connector

The ECG connector is located on the base of the monitor arm.

Figure 10-22. ECG connector

## ECG Trace Monitor Display

The scanned image is synchronized with the ECG trace. In Doppler or M-Mode, the traces are synchronized with that particular mode's sweep.

The user can control the gain, position and sweep speed of the traces using the touch panel controls.

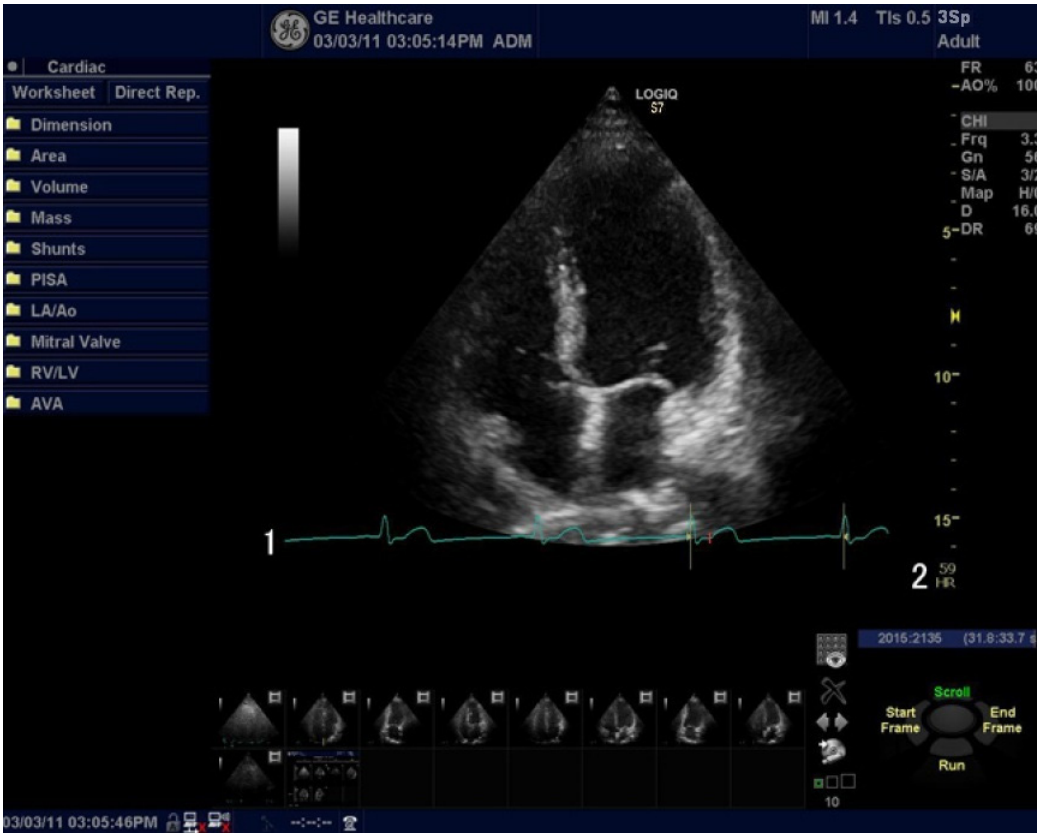



Figure 10-23. ECG Trace Display

1. ECG
2. Auto Heart Rate Display

## ECG touch panel

The ECG touch panel provides for control of the input signals.

Without the ECG option, the ECG touch panel is not displayed.

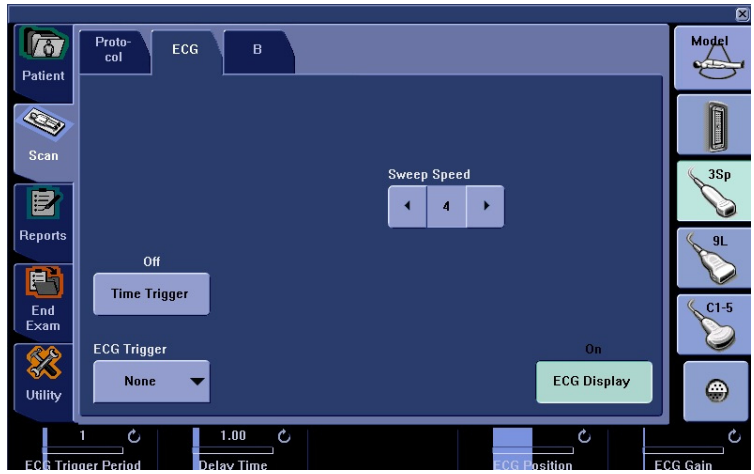



Figure 10-24. ECG touch panel

Table 10-13: ECG parameters

| Parameter | Description |
|---|---|
| Sweep Speed | Change the speed of the trace. The sweep speed of the physio signal on the B-Mode image can be set independent of the timeline (Doppler and M-Mode) sweep speed. |
| Timer Trigger | On/Off. Enables intermittent imaging based on a timer.<br>NOTE: If Timer Trigger is turned on, the ECG Trigger is set to None. |
| ECG Trigger | Enables intermittent imaging based on the ECG. The trigger location(s) relative to the R trigger are set with the Delay Time key.<br>Press ECG Trigger and select one of the options (None, Trig1, Trig2, and Both) and adjust the delay time using the Delay Time key.<br>• ECG Trig 1 specifies the delay (ms) from R-wave to triggered frame.<br>• ECG Trig 2 specifies the delay from R-wave to second frame.<br>• Both activates ECG Trig 1 and ECG Trig 2 simultaneously. Trig 2 must be greater than Trig 1 for dual triggering (Both) to be active.<br>NOTE: If other than None is selected, Timer Trigger is turned off. |
| ECG Display | Provides the ability to turn on the ECG trace and Auto Heart Rate for display on the monitor. |

Table 10-13: ECG parameters (Continued)

| Parameter | Description |
|---|---|
| ECG Trigger Period | The control specifies the number of heart cycles (R-waves) that are skipped between ECG triggers.<br>The default is 1 or no skipping. |
| Delay Time | In ECG Trigger Mode: If only ECG Trig1 or ECG Trig2 is selected via the ECG Trigger key, the Delay Time key controls the R-Delay time of the active trigger. If both triggers are selected (Both), press this key to toggle ECG Trig1 and ECG Trig2 and rotate the key to change the delay time. Once the trigger is set, the snap shot image is displayed each time the update line passes the active trigger(s).<br>In Timer Trigger Mode: Rotating the knob changes the delay time between images. |
| ECG Gain/Position | Allows for the amplitude control of the ECG trace or allows for the vertical positioning of the ECG trace on the image display.<br>Press the knob to toggle between Gain and Position. The default is Gain. |

# Chapter 11

# Vascular

*Describes how to perform Vascular measurements and calculations.*

# Vascular Exam Preparation

## Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

## General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the touch panel Menu.

# Vascular Measurements

## Introduction

Vascular measurements offer several different types of measurement studies:

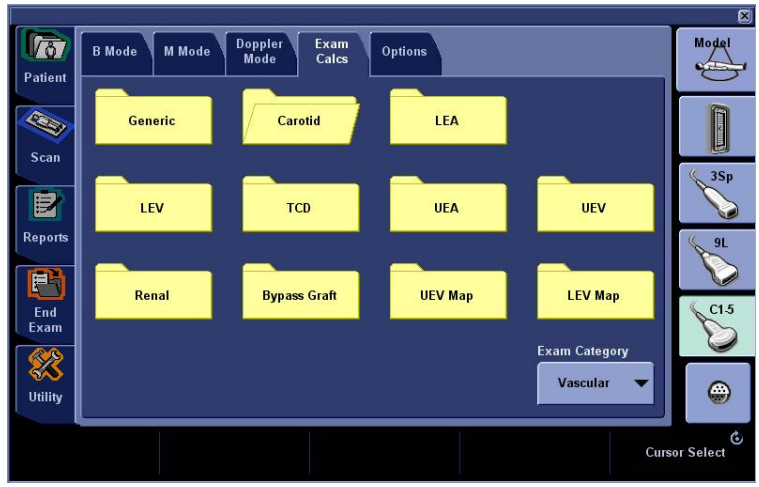



Figure 11-1. Vascular Exam Category touch panel

- Generic – Common to all applications. See ‘Generic Measurements’ on *page 7-82 for more information.*
- Carotid
- LEA (Lower Extremity Artery)
- LEV (Lower Extremity Vein)
- TCD (Trans Cranial Doppler)
- UEA (Upper Extremity Artery)
- UEV (Upper Extremity Vein)
- Renal
- Bypass Graft
- UEV (Upper Extremity Vein) Map
- LEV (Lower Extremity Vein) Map

## Introduction (continued)

To change an exam calc:

1. Select ***Exam Calcs***.

   The Vascular exam category allows you to choose from the displayed exam calcs.

2. To select another exam calcs, press the desired exam calcs folder.

A vascular study is a group of particular vessels. You can customize the vessel exam calcs in the configuration menu. See ‘Measurement and Calculation Setup’ on *page 7-16 for more information.*

When you use Auto Vascular calculation, you use the vessel keys on the touch panel to post-assign vascular calculations. When you are not using Auto Vascular calculation, the vessel key is used for manual measurement.

## IMT Measurement

You can measure the average of the intima media thickness for use as the index of arterial sclerosis.

IMT can be measured both on the posterior and the anterior walls of the vessel.

*NOTE: Due to the physical properties of ultrasound imaging, the posterior IMT measurement is generally more accurate than the anterior IMT measurement.*

### IMT Measurement - Auto

Auto IMT automatically measures the thickness of the Intima Media on the far and near vessel walls. Near Wall IMT is the distance between the trailing edges of the adventitia and intima; the Far Wall IMT is the distance between the leading edges of the adventitia and intima.

Set up the parameters you want to record on the worksheet on the Utility -> Measure -> M&A page while are in the Carotid application. Select CCA/ICA/BIF -> IMT Far/Near -> Parameter (Average, Max, Min, Standard Deviation, Points, or Distance).

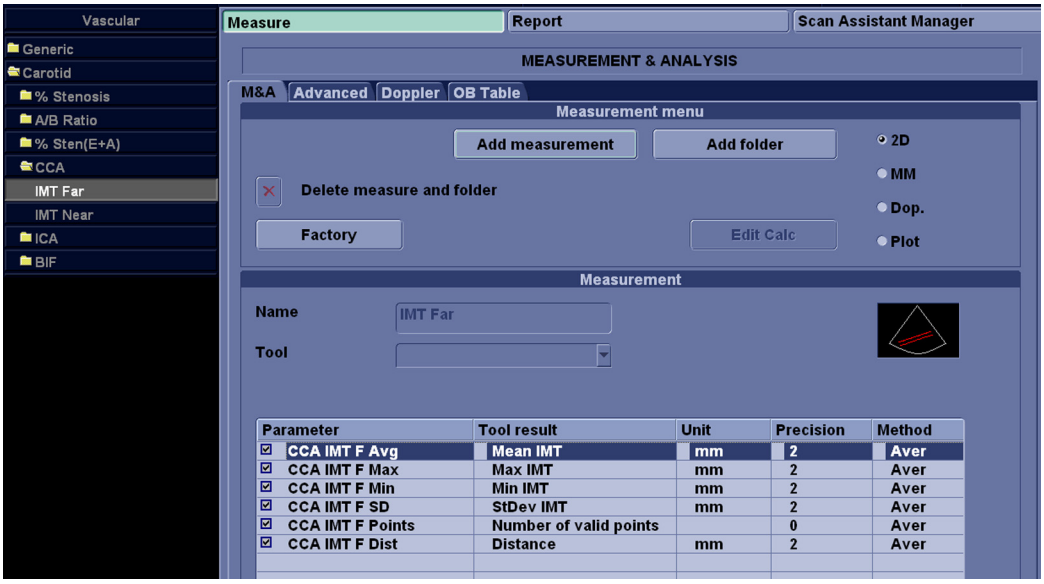



Figure 11-2. Configuring Auto IMT

## IMT Measurement - Auto (continued)

In the Vascular Carotid application, the Auto IMT measurement is available.

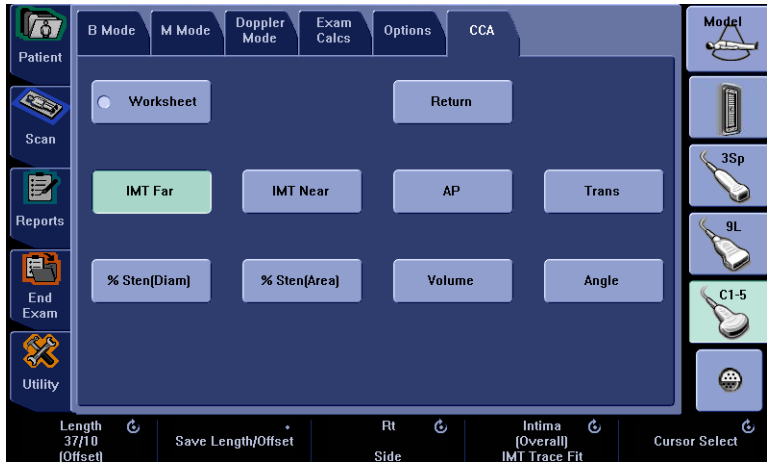



Figure 11-3. Auto IMT touch panel

The following controls are available.

Table 11-1: Auto IMT touch panel Description

| Parameter | Description |
|---|---|
| Worksheet | Select to view the Worksheet |
| IMT Far | Select to begin the Far Field IMT measurement. |
| IMT Near | Select to begin the Near Field IMT measurement. |
| Length/Offset Rotary | -40/+40 Length. At zero, you can freely adjust the length, but only vertically.<br>Offset distance, -20 (Left) / +20 (Right) |
| Save Length/Offsest | Push to save Length/Offset as a preset.<br>Press key to save value as default. |
| Overall / IMT Trace Fit / Intima | Adjusts (remeasures) the IMT automatically measured by the system. |
| Rt / Lt Side | Select Left / Right Side. |
| Cursor Select | Allows you to update cursor placement. |

## IMT Measurement - Auto (continued)

To measure the IMT,

1. In the Carotid application, press **Freeze**, press **Measure**.
2. Select the appoprirate IMT measurement. For example, if measuring the IMT of the far wall of the right common carotid artery, select Rt CCA folder, and then ***IMT Far***.
3. Use the **Trackball** to set the length.

   Or

   Use the ***Length / Offset*** control on the touch panel to set the length and offset distance. The Offset key controls how far away from the vertical line the measurement starts. Length is the length of the tool itself. If set to zero, you can adjust it anywhere on the image.
4. Press **Set**.

   You can either adjust the trace prior to pressing the Print key or press the Print key to store the image which also saves the measurement to the Worksheet.

   To adjust the trace, use the ***Overall IMT Trace Fit Intima*** control on the touch panel. The Trace fit (up/down) adjusts the inter luminal line whereas the overall (rotate) adjusts both IMT lines.

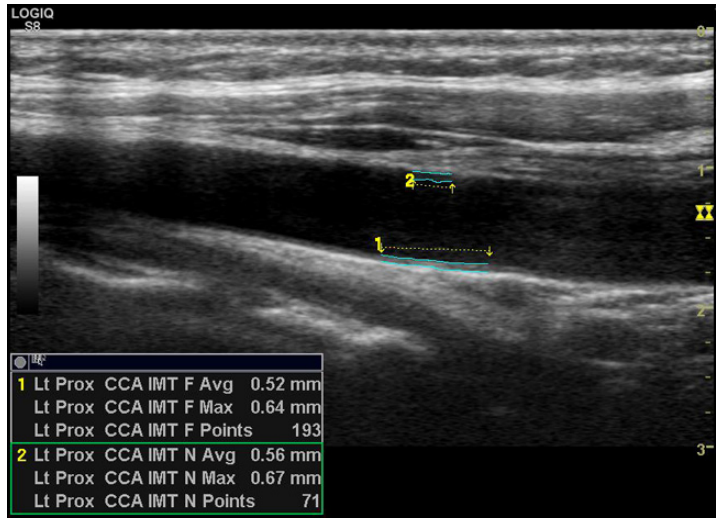



Figure 11-4. Example of Auto IMT Far Measurement

## IMT Measurement - Auto (continued)

5. Position the cursor, then select IMT Near.
6. Use the **Trackball** to set the length.

   Or

   Use the ***Length / Offset*** control on the touch panel to set the length and offset distance.
7. Press **Set**. “Store image to accept IMT measurement” displays in the message area. If the traces fit both layers of the wall, approve the measurement by pressing the **Print** key to store the image.

   To adjust the trace prior to pressing the Print key, use the IMT Trace Fit control on the touch panel. The measurement is saved to the Worksheet.

*NOTE: Since the IMT measurements are semi-automatic, the operator has to approve the detection by visual inspection before storing the results in the worksheet and report.*

## IMT Measurement - Manual

1. Before you measure the IMT, add the IMT measurement to the Carotid folder via the Measurement & Analysis screen (by selecting one of the three types of IMT measurements under Add Measurement in the M&A screen).
   - IMT: Three vertical lines are parallel. Place the start point on the line and place the end point anywhere.
   - IMT2: Each vertical line can be rotated with the **Ellipse** control. You must place the start and end points on the line.
   - 5mm Scale: The horizontal line can be rotated with the **Ellipse** control. A maximum of 20 distance values which produce one average value can be taken. The number of distance values is specified when adding the measurement in the M&A screen.

   IMT and IMT2 have three kinds of measurements:
   - IMT --+/IMT2 --+: Measure from right to left.
   - IMT -+-/IMT -+-: First measure at the center, then right and left are last.
   - IMT+--/IMT2 --+: Measure from left to right.
2. Acquire a longitudinal scan of the carotid artery and optimize the image. Then press **Freeze**.
3. Scroll to an end-diastolic frame where the intima layer is clearly visible.

## IMT Measurement (continued)

4. Press **Measure**, then select ***IMT1***, ***IMT2*** or ***5mm scale***. An active caliper displays.

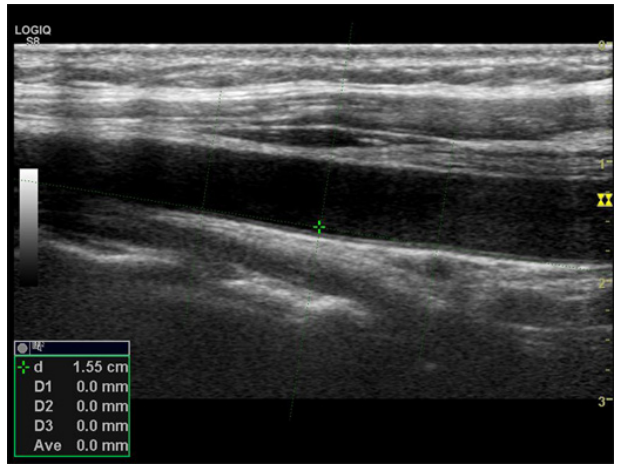



Figure 11-5. IMT caliper (Example)

5. Use the **Trackball** to move the caliper and the **Ellipse** control to adjust the angle. Press **Set** to fix the caliper.

*NOTE: The interval of the vertical line for IMT1 and IMT2 is 1cm and for the 5mm scale is 5mm.*

6. Measure the thickness of three points for IMT1 and IMT2.

   OR

   Measure the thickness of the specified number of points for the 5mm scale.

*NOTE: The caliper moves to the next point automatically.*

## IMT Measurement (continued)

7. After you complete the measurement, the system calculates the average automatically.

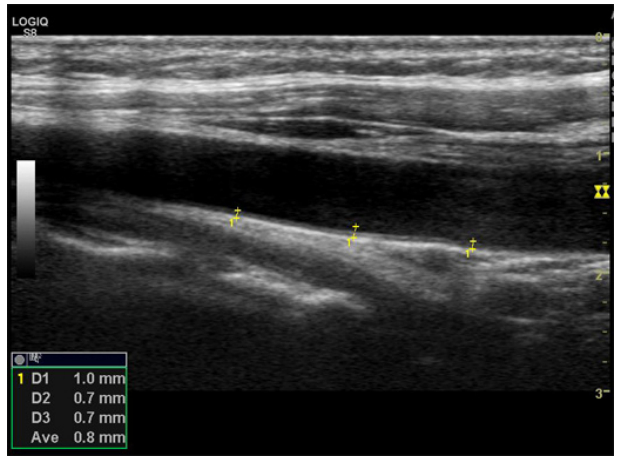



Figure 11-6. IMT Measurement

## Plaque Score Tool

1. Before you measure, add Plaque Score to the Carotid folder at the Utility -> Measure -> Measurement & Analysis screen (by selecting 2D Plaque Score under Add Measurement in the M&A screen).

   Label the parameters you want measured:

   - Distance value (up to 20)
   - Sum (greater or equal to 1.1 mm)
   - Count (greater or equal to 1.1 mm)
   - Maximum value of each area
   - Average value
   - Average value of each area

2. Scan the carotid artery and press **Freeze**. Display dual images to measure across split screen images.
3. Press **Measure** and select ***Plaque Score Tool***. An active caliper, one horizontal line and five vertical lines display. The interval of the vertical lines are 1.5 cm.

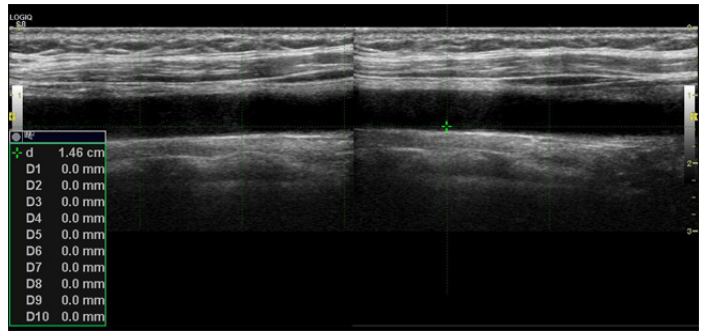



Figure 11-7. Plaque score example

4. Use the **Trackball** to move the caliper and the **Ellipse** control to adjust the angle. Press **Set** to fix the caliper.

## Plaque Score Tool (continued)

5. Measure the thickness (up to twenty times) on any place as necessary.

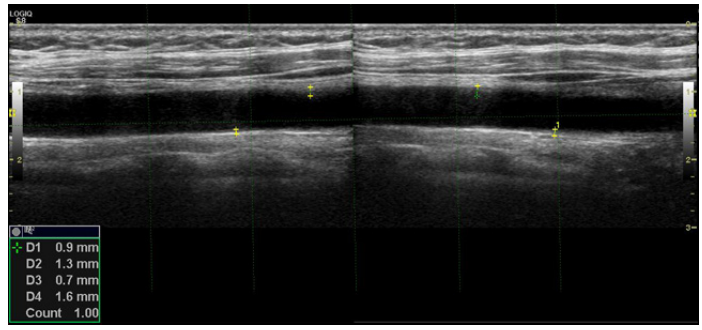



Figure 11-8. Plaque Score Example 2

6. The system displays the measurement result.

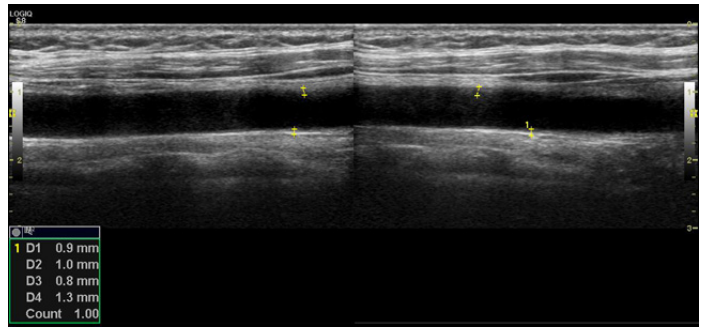



Figure 11-9. Plaque Score Example 3

*NOTE: Only calculates the value larger than 1.1mm.*

7. Double click the **Set** key to finish the measurement.

## Auto Vascular Calculation Overview

Auto Vascular Calculation enables the LOGIQ S7 Expert/Pro to detect and identify a cardiac cycle. It allows you to assign measurements and calculations during live timeline imaging, while the image is frozen, or in CINE. Peak values are detected for venous flow.

During cardiac cycle detection, the system identifies the cardiac cycle using calipers, vertical bars, and/or highlighting of timeline data. Use of identifiers is based on measurements and calculations selected by an operator for the current application. The system may place calipers at early systolic peak, peak systole, minimum diastole and end diastole. Vertical bars may also be placed to indicate the beginning and end of the cardiac cycle. The peak and/or mean trace may be highlighted. You can edit the cardiac cycle identified by the system or select a different cardiac cycle.

You can select the calculations to be displayed in the M&A Result window during live scanning or on a frozen image. These calculations are displayed at the top of M&A Result Window located adjacent to the image. These calculations are presettable by application which means you can set up the default calculations to be displayed for each application.

# Auto Vascular Calculation

## Activating Auto Vascular Calculation

To activate Auto Vascular Calculation, select **Auto Calc** from Live (calculations displayed on the real-time image), or Freeze (calculations displayed on the frozen image).

To deactivate Auto Vascular calculation, select Off.

## Setting up Auto Vascular Calculation Parameters

- **Selecting Auto Trace**

  You can select to have a continuous auto trace of the max or mean velocities.

  - Select Max or Mean using the ***Trace Method*** touch panel pull-down menu.

- **Selecting Trace Direction**

  Trace Direction lets you use peak timeline data above, below, or composite (above and below) the baseline.

  - Select Positive, Negative or Both to set the peak timeline data.

- **Modify Calculation**

  a. Select the ***Modify Calcs*** touch panel key.

  The Modify Calculation menu is displayed.

  b. Select which measurements and calculations are to be displayed in the Auto Vascular calculation window.

  You can select the following parameter: PS, ED, MD, HR, TAMAX, PI, RI, Accel, PS/ED, ED/PS, AT, Volume Flow, PV.

## Auto Vascular Calculation (continued)

### Auto Vascular Calculation Exam

1. Preset the system.
2. Perform the scan and press **Freeze**.
3. Activate Auto Vascular Calculation.

   The system performs a calculation automatically.

Figure 11-10. Auto Vascular Calculation

## Auto Vascular Calculation Exam (continued)

The Auto Vascular calculation is assigned to particular vessel measurements.

1. Press **Measure** to display the Measurement menu.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel name from the touch panel.

   Selected vessel measurements are automatically assigned with the Auto Vascular calculation. The results are then displayed in the Results Window.

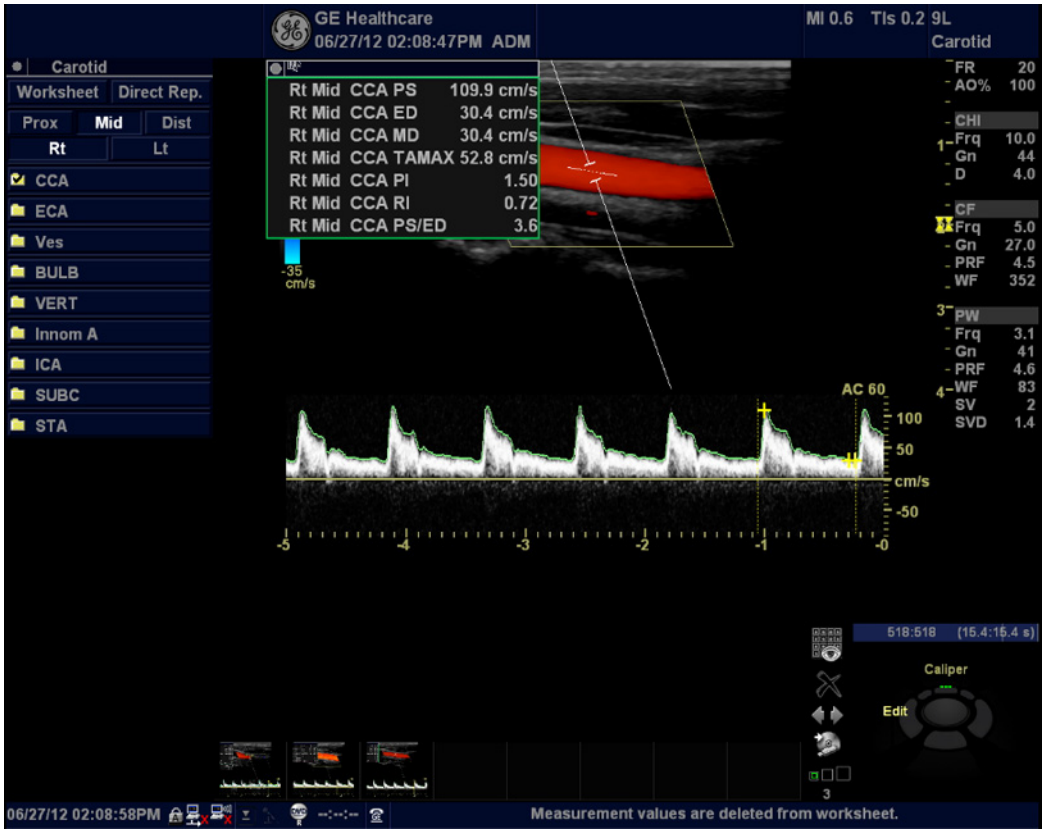



Figure 11-11. Assigned Vessel

*NOTE: When you want to cancel the assignment, you can use the **Cancel Transfer** touch panel key. See 'Cancel Transfer' on page 7-100 for more information.*

## Auto Vascular Calculation (continued)

During the course of an exam, the cardiac cycle may be indicated between two yellow bars; the peak trace and the mean trace may appear in green; calculation indicators appear on the spectral trace as a caliper identifier (these vary, depending on the selected calculation in the Results Window).

The right-most, most complete cycle is typically chosen to be the selected cardiac cycle. You can select a different cardiac cycle.

To select a different cardiac cycle:

- Move through CINE memory with the Trackball until the desired cardiac cycle is selected by the system.

*NOTE: You need several good cycles in front of the new cardiac cycle for this to be successful. Oftentimes, this is problematic near a freeze bar.*

- Use the ***Cycle Select*** control to cycle to a different cardiac cycle.

*NOTE: You need several good cycles in front of the new cardiac cycle for this to be successful. Oftentimes, this is problematic near a freeze bar.*

To move the systole or diastole position:

- Use the ***Cursor Select*** control to move the start systole position or the end diastole position.

## Manual Vascular Calculation

You can perform the following calculations manually when Auto Doppler Calculation is not activated.

1. Press **Measure**.

   If necessary, you can select another Exam Calc and then select parameters from Modify Calculation.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel folder.

   The Measurement menu is displayed.

Figure 11-12. Measurement Menu Example

4. Make the required measurements according to the system, or select your preferred measurements.

## Manual Vascular Calculation (continued)

For each vessel in Doppler mode, you can make any of the following measurements:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- TAMEAN
- Pulsatility Index (PI)
- Resistive Index (RI)
- S/D Ratio
- D/S Ratio
- Acceleration (Accel)
- Acceleration Time (AT)
- Volume Flow
- Peak Value (PV)

## To select vascular measurements

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder you want to measure.

Figure 11-13. Aorta folder - example

2. Select ***Show All***.
   The system displays all possible vessel measurements.

## To select vascular measurements (continued)

3. Select the desired measurement.

Figure 11-14. Show All measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

## Naming format for vessels

When you want to measure a vessel, on the touch panel you select the folder for the vessel. Many vessel folders are labeled with an abbreviation. The following table lists abbreviations used for naming vascular vessels.

Table 11-2: Vascular Vessel Abbreviations

| Acronym | Name |
|---|---|
| ACA | Anterior Cerebral Artery |
| Acc RA | Accessory Renal Artery |
| AComA | Anterior Communicating Artery |
| Anast | Anastomosis |
| ArcA | Arcuate Artery |
| ATA | Anterior Tibial Artery |
| ATV | Anterior Tibial Vein |
| AVF | Arteriovenous Fistula |
| Axill | Axillary Artery |
| Axill V | Axillary Vein |
| BA | Basilar Artery or Brachial Artery |
| Bas V | Basilic Vein |
| BasV Antecub | Basilic Vein Antecubital Fossa |
| BIF IMT F/N | Bifurcation Intima Media Thickness Far/Near |
| Brac V | Brachial Vein |
| CA | Celiac Artery |
| CCA | Common Carotid Artery |
| Ceph V | Cephalic Vein |
| Ceph V Antecub | Cephalic Vein Antecubital |
| CFA | Common Femoral Artery |
| CFV | Common Femoral Vein |
| CHA | Common Hepatic Artery |
| Com Femoral | Common Femoral Artery |
| CIA | Common Iliac Artery |
| CIV | Common Iliac Vein |

Table 11-2: Vascular Vessel Abbreviations (Continued)

| Acronym | Name |
|---|---|
| Com Iliac A | Common Iliac Artery |
| DFA | Deep Femoral Artery |
| DFV | Deep Femoral Vein |
| Dors Pedis | Dorsalis Pedis |
| DPA | Dorsalis Pedis Artery |
| ECA | External Carotid Artery |
| EIA | External Iliac Artery |
| EIV | External Iliac Vein |
| Fr. Branch | Frontal Branch |
| FV | Femoral Vein |
| GBWall | Gall Bladder Wall |
| GDA | Gastro duodenal Artery |
| GR | Graft |
| GSV | Greater Saphenous Vein |
| HA | Hepatic Artery |
| Hilar A | Hilar Artery |
| HV | Hepatic Vein |
| IIA | Internal Iliac Artery |
| IIV | Internal Iliac Vein |
| ICA | Internal Carotid Artery (Transcranial Doppler) |
| ICA | Interior Carotid Artery (Carotid Artery) |
| IJV | Internal Jugular Vein |
| IMA | Inferior Mesenteric Artery |
| IMT | Intima Media Thickness |
| IMV | Inferior Mesenteric Vein |
| Inn | Innominate |
| Int. Lobular A | Interlobular Artery |
| IVC | Inferior Vena Cava |
| LSV | Lesser Saphenous Vein |
| MCA | Middle Cerebral Artery |

Table 11-2: Vascular Vessel Abbreviations (Continued)

| Acronym | Name |
|---|---|
| Mcub V | Median Cubital Vein |
| Mid Hep V | Middle Hepatic Vein |
| MPV | Main Portal Vein |
| MRA | Main Renal Artery |
| Par. Branch | Parietal Branch |
| PCA | Posterior Cerebral Artery |
| PComA | Posterior Communicating Artery |
| Peron | Peroneal |
| POP | Popliteal |
| Pseudo | False Artery (aneurysm) |
| PTA | Posterior Tibial Artery |
| PTV | Posterior Tibial Vein |
| PV | Portal Vein |
| RA | Renal or Radial Artery |
| RV | Renal or Radial Vein |
| SA | Splenic Artery |
| Sap Fem Junc | Sapheno-Femoral Junction |
| Seg. A | Segmental Artery |
| SFA | Sapheno-Femoral Artery |
| SFJV | Sapheno-Femoral Junction Vein |
| SMA | Superior Mesenteric Artery |
| SMV | Superior Mesenteric Vein |
| SSV | Small Saphenous Vein |
| STA | Superficial Temporal Artery |
| SUBC | Subclavian Artery |
| SUBC V | Subclavian Vein |
| SV | Splenic Vein |
| SV Pop Junc | Small Saphenopopliteal Junction |
| TCD | Transcranial Doppler |
| TIPS | Transjugular Intrahepatic PortalSystemic Shunt |

Table 11-2: Vascular Vessel Abbreviations (Continued)

| Acronym | Name |
|---|---|
| UA | Ulnar Artery |
| UV | Ulnar Vein |
| VERT | Vertebral Artery |
| VES | Vessel |

# Vascular Worksheet

The vascular worksheet is structured to automatically display vascular measurements made at specific anatomical sites. The worksheet can also display an average, last, maximum, or minimum value of the latest three measurements. Calculated ratios are automatically summarized and displayed.

## To view the Vascular Worksheet

1. Press **Measure**.
2. Select ***Worksheet***.

   The system displays the worksheet.

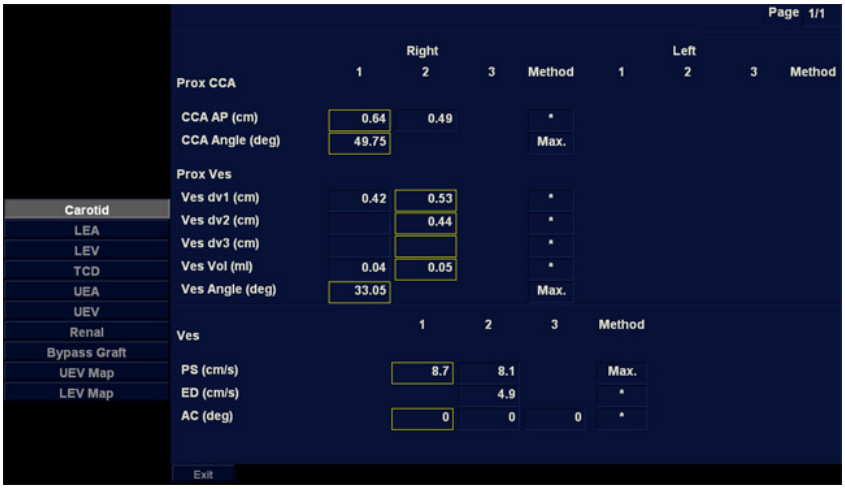



Figure 11-15. Vascular Worksheet Example

## To view the Vascular Worksheet (continued)

Only measured parameters are displayed. Location information is labeled with vessel name first. Measured parameters of the vessel are grouped under the vessel label.

Selected value by method is highlighted, however, when the average method is selected, the highlighted cursor is removed.

When an entire vessel measurement does not have sides (left or right), the side label is not displayed in that vessel study worksheet.

HINTS

Some fields on the worksheet are view only, and others you can change or select. To easily see which fields you can change or select, move the **Trackball**. As the cursor moves over a field that you can change or select, the field is highlighted.

## Worksheet touch panel

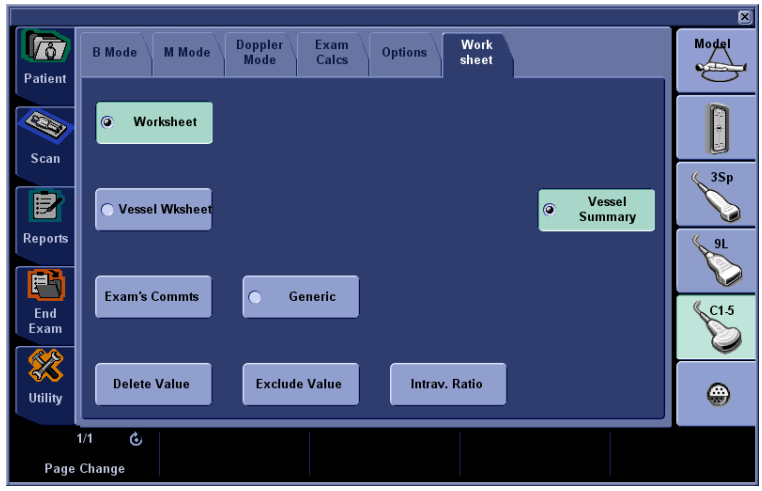



Figure 11-16. Worksheet touch panel

1. **Worksheet**: To exit the worksheet and return to scanning.
2. **Vessel Worksheet**: Select this key to display the Vessel Worksheet when the Vessel Summary is displayed.
3. **Vessel Summary**: Select this key to display the Vessel Summary when the Vessel Worksheet is displayed.
4. **Examiner's Comment**: Select this key to display the Examiner's comment window. See 'To edit a worksheet' on *page 11-30 for more information.*
5. **Generic**: Select this key to display the Generic Worksheet. Generic study measurements/calculations, such as volume and velocity, are displayed on this worksheet.
6. **Delete Value**: Use to delete a value (each measurement value). See 'To edit a worksheet' on *page 11-30 for more information.*
7. **Exclude Value**: Use to exclude a value from the result line. See 'To edit a worksheet' on *page 11-30 for more information.*
8. **Intravessel Ratio**: Select this key to display the Intravessel Ratio Calculation window. See 'Intrasvessel ratio' on *page 11-35 for more information.*
9. **Page Change** (knob): If a worksheet has more data, to view the next page, adjust the Page Change knob.

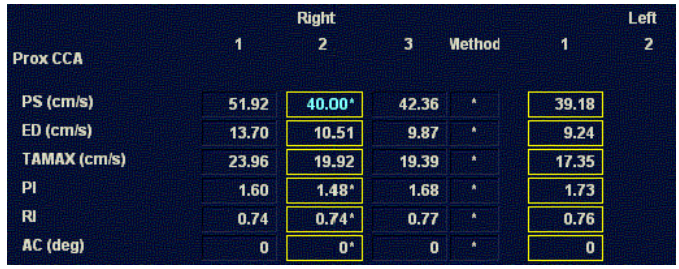
## To edit a worksheet

To change data on a worksheet:

1. Select **Worksheet** from any page of the Vascular Calculation touch panel.
2. To position the cursor at the field you want to change, move the **Trackball**.

   The field is highlighted. Press **Set**.
3. Type the new data in the field and move the cursor to another place. Press **Set**. The new data is displayed in blue and asterisk are appended to value and resultant value to indicate that it was manually entered.

   The average measurements, calculations and ratios are automatically updated to reflect the edited values.



| Prox CCA | Right 1 | Right 2 | Right 3 | Method | Left 1 | Left 2 |
|---|---|---|---|---|---|---|
| PS (cm/s) | 51.92 | 40.00* | 42.36 | * | 39.18 | |
| ED (cm/s) | 13.70 | 10.51 | 9.87 | * | 9.24 | |
| TAMAX (cm/s) | 23.96 | 19.92 | 19.39 | * | 17.35 | |
| PI | 1.60 | 1.48* | 1.68 | * | 1.73 | |
| RI | 0.74 | 0.74* | 0.77 | * | 0.76 | |
| AC (deg) | 0 | 0* | 0 | * | 0 | |

Figure 11-17. Display of the edited value

*NOTE: If the user moves the cursor to the edited value and presses the **Set** key once, the value returns to the original value before the edit.*

## To edit a worksheet (continued)

To delete data:

1. Select **Worksheet** from any page of the Vascular Calculation touch panel Menu.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   The field is highlighted.
3. Select ***Delete Value***.

For Example:

1. If the user measured RI 4 times, however, latest 3 sets of measurements were displayed in the worksheet.

Table 11-3: Example of Latest Measurements in Worksheet

| Result Number | #2 | #3 | #4 |
|---|---|---|---|
| PS | 0.500 | 0.600 | 0.700 |
| ED | 0.100 | 0.200 | 0.300 |
| RI | 0.800 | 0.667 | 0.571 |

1. Then, the user deleted PS value of #3 from the worksheet.
2. The whole set of #3 measurements is deleted from the worksheet and #1 set of measurements is shifted and displayed as below.

Table 11-4: Example of Worksheet after Value Deleted

| Result Number | #1 | #2 | #4 |
|---|---|---|---|
| PS | 0.400 | 0.500 | 0.700 |
| ED | 0.000 | 0.100 | 0.300 |
| RI | 1.000 | 0.800 | 0.571 |

## To edit a worksheet (continued)

To exclude data:

When the user selects a particular value on the Worksheet and selects ***Exclude Value***, this value is excluded from result line and resultant value is re-calculated without this value and also calculation values using this value is ‘blank’.

1. Select **Worksheet** from any page of the Vascular Calculation touch panel Menu.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   The field is highlighted.
3. Select ***Exclude Value***.
4. The data in the field is not visible and is not included in worksheet calculations as below.
5. To include a value that you previously excluded, select ***Exclude Value***.

Figure 11-18. Display of the excluded value

## To edit a worksheet (continued)

To select the method:

The user can select the method for calculating the cumulative value.

This value is only calculated by using displaying values. If the user takes parameters more than 3 times, the last 3 values are used for this calculation.

1. Move cursor to method column and press **Set**.
2. The pull-down menu is displayed. Move to cursor any one of methods and press **Set**. The selected method is displayed in the column.

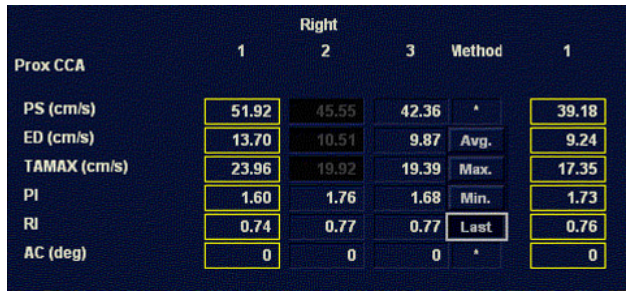



Figure 11-19. Pop-up menu of methods

## Examiner's Comments

To type a comment on a worksheet:

1. Select ***Exam's Commts***.
   The Examiner's Comments window opens.
2. Type comments about the exam.
3. To close the Examiner's Comments window, select ***Exam's Commts***. The comments appear on the report.

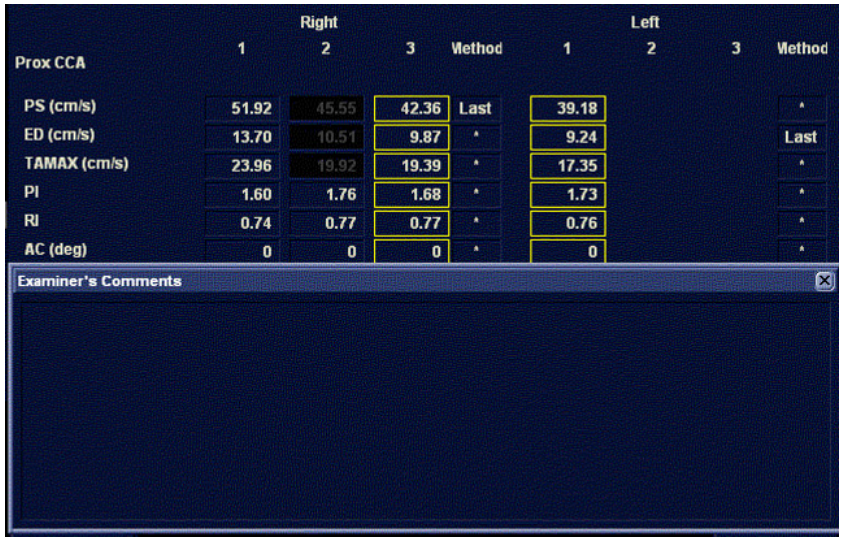



Figure 11-20. Examiner's comments field

## Intrasvessel ratio

To calculate Intravessel ratio, you need a measurement of assessing pressure and stenotic velocities.

1. Select ***Intrav. Ratio*** to display the pop-up window in the header section of the worksheet.

Figure 11-21. Intravessel Pop-up Window

2. Select the first velocity.

   The value is displayed in the window.

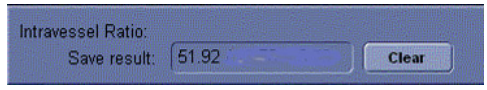



Figure 11-22. Intravessel ratio one

## Intrasvessel ratio (continued)

3. Select the second velocity.

   The second value and Result value are displayed in the window.

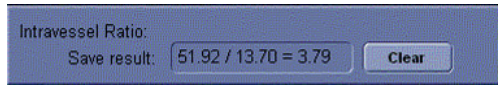



Figure 11-23. Intravessel ratio two

- To save the Intravessel ratio to the Vessel Summary, move the cursor to ***Save*** and press **Set**.
- To clear values, move the cursor to **Clear** and press **Set**.
- To cancel and exit Intravessel ratio, move the cursor to Cancel and press **Set**.

*NOTE: Intravessel Ratio is only displayed and saved in the Vessel Summary as Intra-Ratio.*

## Vessel Summary

The Vessel Summary is designed to automatically display measurements made at specific anatomical sites. Calculated ratios are automatically summarized and displayed.

The Vessel Summary can be displayed at any time during the exam by selecting ***Vessel Summary*** from the Vascular Worksheet touch panel.

Figure 11-24. Vessel Summary Example

## Vessel Summary (continued)

1. The first row, indicating Right or Left, is not displayed when the side is not defined in the vessel. In the third column on the second line, you select the calculations. Move the cursor to the third column, and the pop-up menu is displayed. The selected parameter is displayed in every third column.

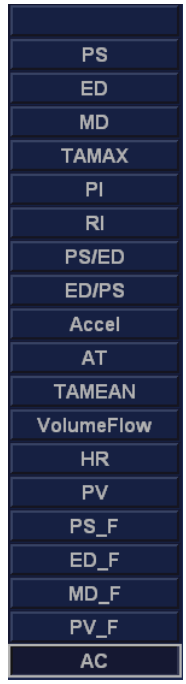



Figure 11-25. Pop-up menu

2. Vessel Name with location information.
3. Check Box. Use to select the vessel velocity for calculating the vessel ratio (ex. ICA/CCA). You can only select one location (position) in a vessel.
4. Result value column. This value cannot be changed or excluded from this page.
5. Calculation name and result. ICA/CCA: The ICA/CCA ratio selects the highest systolic ICA and CCA velocities when calculating this ratio, and displays the velocities.

### Carotid Study

In the configuration page for ICA/CCA ratio, you can specify which portion of the CCA vessel (Prox, mid, distal) is chosen. You can override the selections on the Vessel summary.

The ICA/CCA ratio is able to be configured for either systole or diastole.

The vertebral vessel also has systole and diastole selections. In the summary page, there is a box to select flow reversal for vertebral flows. The choices are Ante (Antegrade), Retr (Retrograde), and Abs (Absent).

To select the method:

Move cursor to the box and press **Set**. After the pop-up menu (Blank, Ante, Retr, Abs) is displayed, select from a menu of choices. The selected choice is displayed in the column.

The box is independent of Left and Right.

### Renal Artery Study

For renal arteries, you can calculate RENAL/AORTIC ratio (RAR) based on peak systolic velocities.

You can combine the two renal summary pages, and have a heading to separate the different measurements (main renal, intra renal). You can scroll between the measurements. The most commonly used, the main renal artery, is the default.

### Lower Extremity Artery Study

For the lower extremity artery, you need an intra vessel ratio (assessing pre vs. stenotic velocities). You can specify which (ratio is stenotic/pre).

The intra-vessel ratio needs to be available for all vascular measurements. This appears on the worksheet only if used.

## Recording Worksheet

The worksheet can be saved as you would any ultrasound image. Once it is displayed on the screen, it can be recorded on the DVR, printed on the B/W printer, stored on media with the Image Archive option.

# *Chapter 12*

# Urology

*Describes how to perform Urology measurements and calculations.*

# Urology Exam Preparation

## Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

## General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again from the touch panel.

The system retains all measurements, but the worksheet retains only the last six measurements of each type.

# Urology Calculations

## Introduction

Urology measurements offer three different types of measurement studies:

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-82 for more information.*
- Urology
  - This chapter describes Urology B-Mode measurements.
  - The Urology M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-96 for more information.*
  - The Urology Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-99 for more information.*
- Pelvic Floor. See ‘Pelvic Floor Measurements’ on *page 12-10 for more information.*

To change a study:

1. Press ***Exam Calcs***.

   The Urology exam category allows you to choose from the displayed studies.
2. To select another study, select the desired study folder.

## Urology B-Mode Measurements

In B-Mode, the Generic Exam Calcs for Urology includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio

See ‘B-Mode Measurements’ on *page 7-86 for more information.*

The following measurements are located specifically in the Urology Exam Calcs. Those specific measurements (Bladder Volume, Prostate Volume and Renal Volume) are listed on the following pages.

Select the Urology Exam Calcs. The following touch panel is displayed.

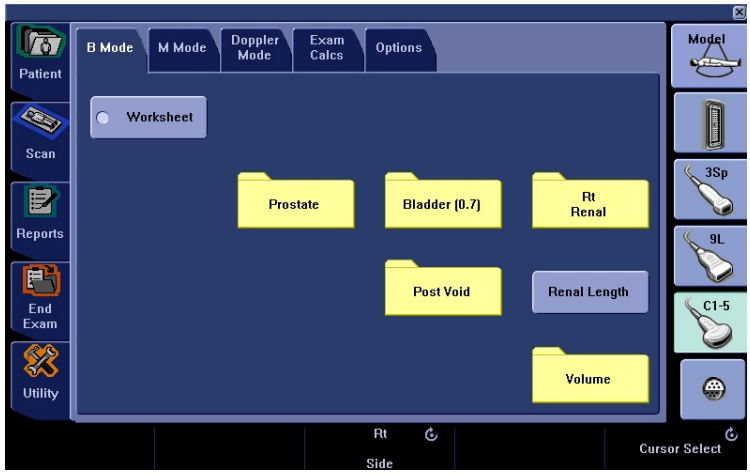



Figure 12-1. Urology Exam Calcs B-Mode touch panel

*NOTE: Bladder (0.7) Vol, Bladder Vol, Post Void Vol, Prostate Vol, Renal (0.8) Vol and Volume can be displayed on the touch panel if preset at the Utility -> Measure screen.*

## Bladder Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

Figure 12-2. Bladder Volume touch panel

To measure Bladder Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Bladder*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the bladder volume in the Results Window.

## Prostate Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

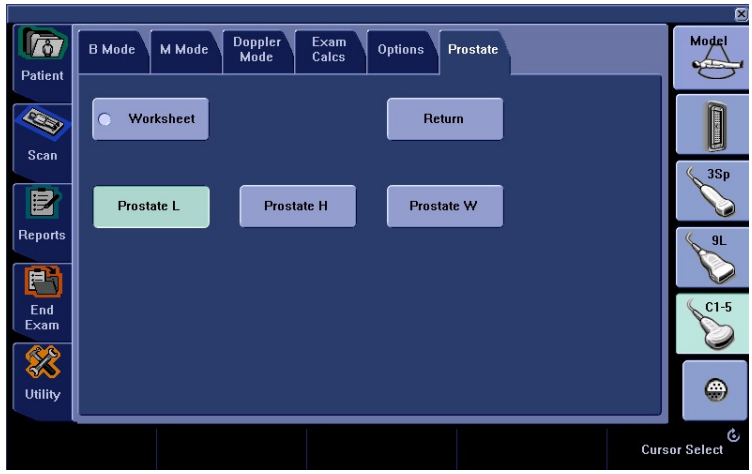



Figure 12-3. Prostate Volume touch panel

To measure Prostate Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Prostate*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the prostate volume in the Results Window.

## Prostate Volume (continued)

### PSA Measurement

If you enter the value of PSA (Prostatic Specific Antigen) and PPSA Coefficient at the Urology Patient screen, PSAD and PPSA are automatically calculated.

The values are displayed on the Worksheet and Report (if set appropriately on the Report Designer page).

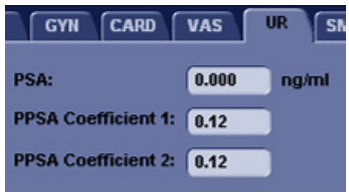



Figure 12-4. Urology Patient Screen

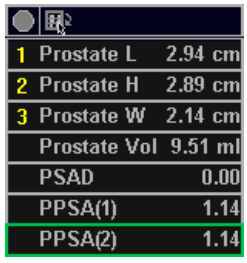



Figure 12-5. Measurement result window

PSAD: Prostatic Specific Antigen (PSA) Density – defined as: PSAD = PSA/Volume

PPSA: Predicted Prostate Specific Antigen – defined as: PPSA = Volume x PPSA Coefficient

## Prostate Volume (continued)

### Worksheet

- For the prostate volume calculation, you can select the method “m1, m2”, ...” in addition to Avg., Max., Min. and Last.
- The value of PSA and PPSA are displayed.

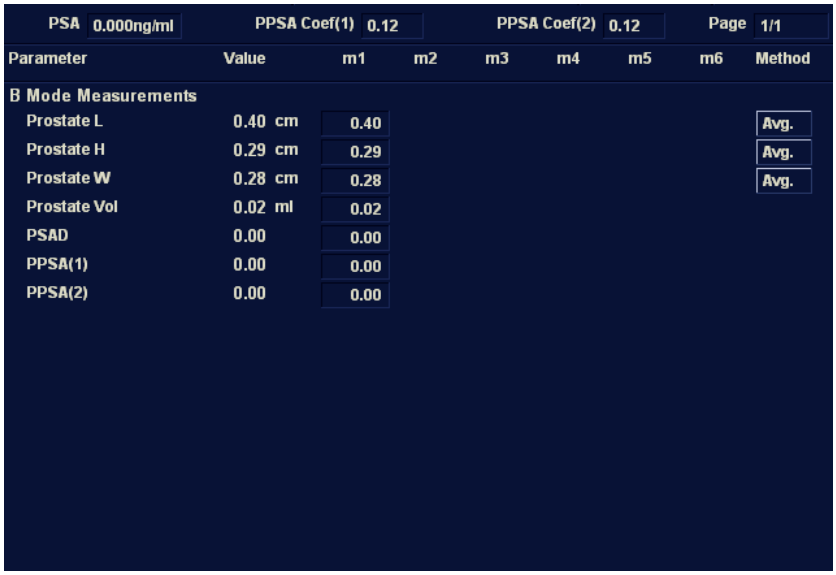



Figure 12-6. Urology Worksheet

## Renal Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

Figure 12-7. Renal Volume touch panel

To measure Renal Volume:

1. Scan the patient in the appropriate scan plane.
2. Select ***Side***.
3. Select the ***Renal*** folder, an active caliper displays.
4. Perform a standard distance measurement:

   The system displays the distance value in the Results Window.
5. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the renal volume in the Results Window.

## Pelvic Floor Measurements

Pelvic floor measurements can be performed in the Pelvic Floor study. The measurements are located in the Exam Calc folder in the Urology preset.

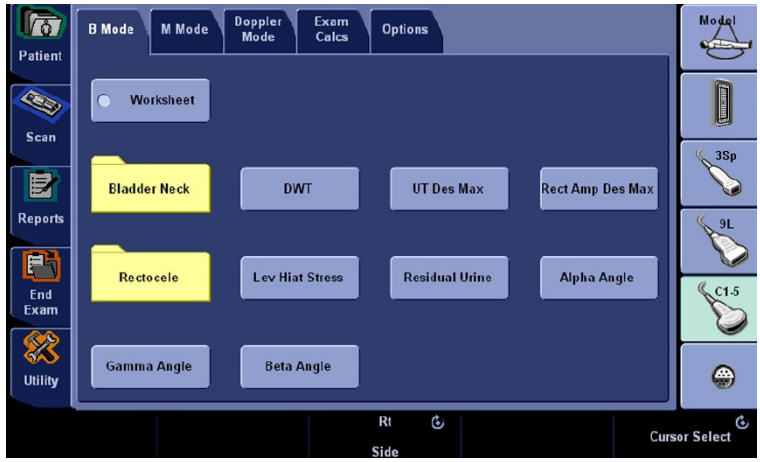



Figure 12-8. Pelvic Floor Study touch panel

### Bladder Neck Rest

Obtain an image with the patient at rest (relaxed).

1. Create a straight line (zero or baseline) to line up with the inferior/posterior of symphysis pubis bone.
2. Once the baseline is positioned, a caliper appears. Position the caliper at the anterior margin of the bladder neck. A positive number displays since the caliper is placed below the baseline.
3. A distance is calculated in millimeters.

## Pelvic Floor Measurements (continued)

### Bladder Neck Stress

Obtain an image after the patient performs the Valsalva maneuver.

1. Create a straight line (zero or baseline) to line up with the inferior/posterior of symphysis pubis bone.
2. Once the baseline is positioned, a caliper appears. Position the caliper at the anterior margin of the bladder neck.

   If the bladder neck is below the baseline, the Bladder Neck Stress is a positive number. If the bladder neck is above the baseline (closer to the transducer face), the number is negative.

### Bladder Neck Descent (BND)

The Bladder Neck Descent is a calculation that should be calculated after measuring the Bladder Neck Rest and Bladder Neck Stress.

BND = Bladder Neck Rest - Bladder Neck Stress

*NOTE: If the Bladder Neck Stress is a negative number, it becomes positive and is added to the bladder neck rest measurement.*

### Detrusor Wall Thickening (DWT)

Three distance measurements of the bladder wall dome are calculated into a mean dimension and displayed in millimeters.

### Uterine Descent Max

1. Create a straight line (zero or baseline) to line up with the inferior/posterior margin of symphysis pubis bone.
2. Measure using a 2-caliper dimension to the inferior position of the uterus in a stress image and display in millimeters

## Pelvic Floor Measurements (continued)

### Rectal Ampulla Descent Max

1. Create a straight line (zero or baseline) to line up with the inferior/posterior margin of symphysis pubis bone.
2. Measure using a 2-caliper dimension to the inferior position of the rectal ampulla in a stress image and displayed in millimeters

### Rectocele Depth

Two 2-caliper diameter measurements to measure depth and width of the rectocele. Displayed in millimeters.

### Levator Hiatus Stress

Two 2-caliper diameter measurements and calculate an area displayed as cm squared.

### Residual Urine

Two 2-caliper diameter measurements calculate as:

(x) times (y) times 5.9 minus 14.9 equals Residual Volume displayed in ml.

# Chapter 13

# Pediatrics

*Describes how to perform Pediatrics measurements and calculations.*

# Pediatrics Exam Preparation

## Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

## General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again from the touch panel.

The system retains all measurements, but the worksheet retains only the last six measurements of each type.

The six worksheet measurements can be averaged and the average used in other calculations.

# Pediatrics Calculations

## Overview

Pediatrics measurements offer two different types of measurement studies:

- Generic. The Generic Calculations study is common to all applications. See ‘Generic Measurements’ on *page 7-82 for more information.*
- Pediatric Hip (PedHip).
  - This chapter describes Pediatrics B-Mode measurements.
  - The Pediatrics M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-96 for more information.*
  - The Pediatrics Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-99 for more information.*

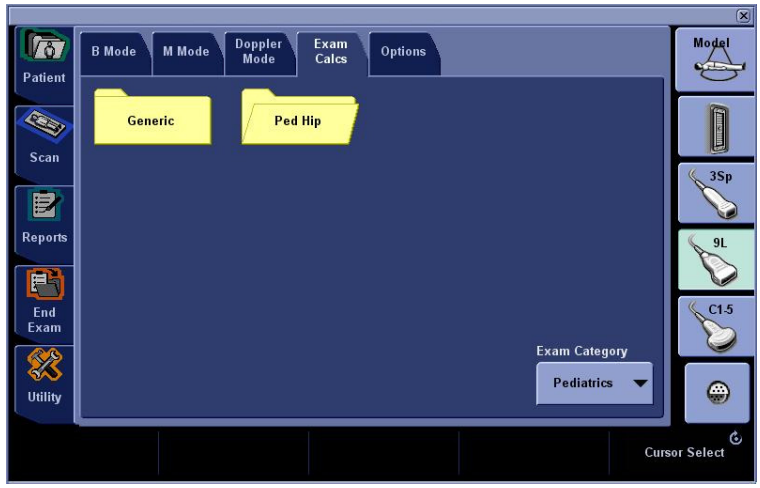



Figure 13-1. touch panel - Pediatrics Exam Calcs

## Pediatrics

Figure 13-2. Pediatrics B-Mode Measurement touch panel

## Hip Dysplasia Measurement

The HIP calculation assists in assessing the development of the infant hip. In this calculation, three straight lines are superimposed on the image and aligned with the anatomical features. The two angles are computed, displayed, and can be used by the physician in making a diagnosis.

The three lines are:[1]

1. The baseline connects the osseous acetabulum convexity to the point where the joint capsule and the perichondrium unite with the iliac bone.
2. The inclination line connects the osseous convexity to labrum acetabulare.
3. The Acetabulum roof line connects the lower edge of the osilium to the osseous convexity.

The $\alpha$ (Alpha) angle is the supplement of the angle between 1 and 3. It characterizes the osseous convexity. The $\beta$ (Beta) angle is the angle between lines 1 and 2. It characterizes the bone supplementing additional roofing by the cartilaginous convexity.

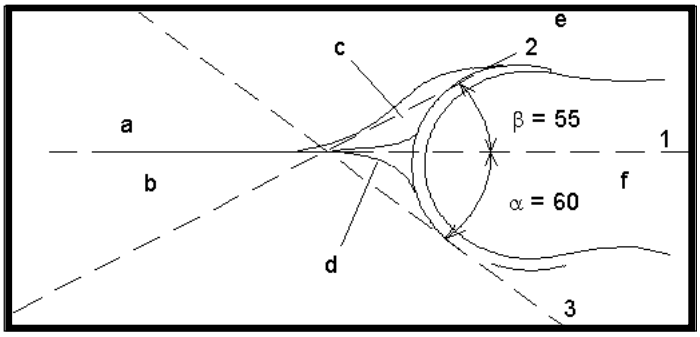



Figure 13-3. Hip Dysplasia

### Anatomical Landmarks

a. Ilium
b. Iliac Bone
c. Labrum
d. Bony Roof
e. Cartilaginous acetabular roof
f. Femoral Head

[1]Source: R GRAF, Journal of Pediatric Orthopedics, 4: 735-740(1984)

## Hip Dysplasia Measurement (continued)

To make a Hip Dysplasia measurement:

1. From the touch panel, select either the ***right*** or ***left side*** (orientation) and then select ***HIP***.

   A horizontal dotted line displays.
2. To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.
3. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
4. To fix the baseline, press ***Set***.

   The system displays a second dotted line at an angle.
5. To place the line along the inclination line of the osseous convexity to labrum acetabulare, move the ***Trackball***.
6. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
7. To fix the second measurement line, press ***Set***.

   The system displays a third dotted line at an angle.
8. To place the caliper along the acetabular roof line, move the ***Trackball***.
9. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
10. To fix the third measurement line and complete measurement, press ***Set***.

    The system displays the hip measurements ($\alpha$ and $\beta$) in the Results Window.

## Alpha HIP

The Alpha HIP measurement measures the angle between the iliac baseline and the bony roof line. To make an Alpha HIP measurement:

1. From the touch panel, select either the ***right*** or ***left side*** (orientation) and then select ***Alpha HIP***.

   A horizontal dotted line displays.
2. To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.
3. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
4. To fix the baseline, press ***Set***.

   The system displays a second dotted line at an angle.
5. To place the caliper along the acetabular roof line, move the ***Trackball***.
6. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
7. To fix the second measurement line, press ***Set***.

   The system displays the alpha hip measurement ($\alpha$) in the Results Window.

## d:D Ratio Measurement

The d:D Ratio measurement measures the percentage of the femoral head coverage under the bony roof. To make this measurement:

1. From the touch panel, select either the ***right*** or ***left side*** (orientation) and then select **d:D Ratio**.

   A horizontal dotted line displays.
2. Use the ***Trackball*** to place the baseline along the ilium. Position the crosshairs edge at the osseous convexity of the ilium.
3. Use the **Ellipse** control to adjust or change inclination or ***Hip Rotate***.
4. Press ***Set*** to fix the baseline.
5. The system displays a circle representing the femoral head. Use the ***Trackball*** to position the circle.
6. Use the **Ellipse** control to size the femoral head circumference.
7. Press ***Set*** to fix the femoral head circumference.

   The system displays the d:D ratio for the femoral head in the Results Window.

# *Chapter 14*

# ReportWriter

*Describes how to generate reports.*

# Standard Report Pages

## Introduction

The LOGIQ S7 Expert/Pro enables the generation of patient reports based on the examination performed and the analyses that were made during the exam. The reports are generated using the data stored in the system with pre-selected templates.

You may edit a report while performing the exam; customize, delete, or add measurements; and save changes until you use the Store command. Once Stored, the reports are read-only.

It is recommended that the data be saved often, and then carefully reviewed before the report is Stored. Use the worksheet to facilitate the review and adjust data before storing a report. The final report can be printed on a standard printer.

## Creating a report

Reports summarize the data obtained in the examination. They can contain data, images, and cine loops.

Once generated, the report can be viewed, images can be added, and the patient's personal data can be modified. The examination data itself CANNOT be changed.

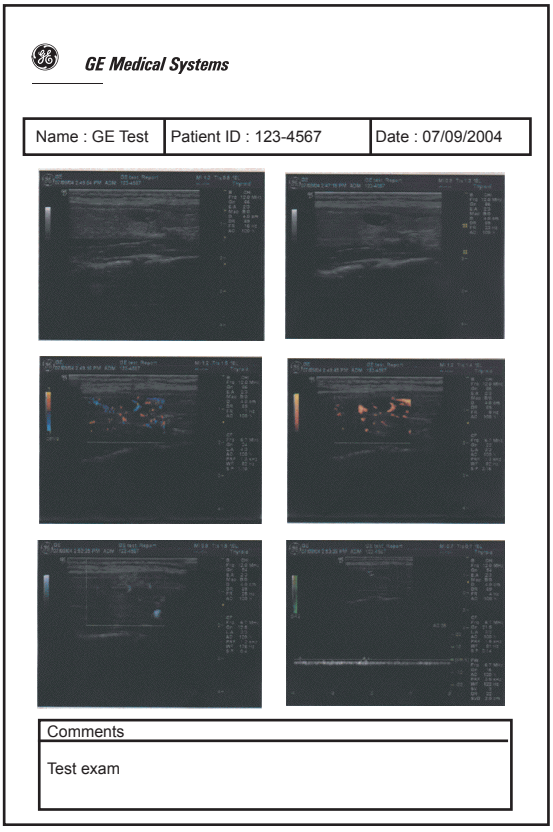



Figure 14-1. Report Example

## Activating the Report

1. Select ***Reports*** on the touch panel.
2. The system displays the default report for the current application on the monitor.

   The information entered during the examination is automatically filled in the appropriate fields (e.g. demographic, diagnosis, comments).

   The preview image appears when the cursor is over the clipboard image.

*NOTE:* *The template is the skeleton of your report. It is composed of different objects that can be customized by the user.*

3. Adjust the ***Page Change*** control to move down the page.

Figure 14-2. Report Page Example

## Activating the Report (continued)

Figure 14-3. Report touch panel

Table 14-1: Report Button Controls

| Button | Description |
|---|---|
| Print | Prints out the report to the default printer. |
| Store | Stores the report page into Archive as CHM* file. |
| Retrieve | Retrieves the report page from Archive.<br>Stored Date/Time is appended to the name of stored report. |
| Template | Selects template from the list of selected applications. |
| Designer | Accesses template editor screen. |
| Save As | Exports the report page to storage media as CHM or PDF format. |
| Delete | Deletes the report page from Archive. |
| Worksheet | Accesses Worksheet Page. |
| Graph | Accesses OB Graph page (applies only to OB). |
| Anatomical Page | Accesses Anatomical Survey page (applies only to OB). |
| *CHM is a compressed HTML help file. | |

## Selecting another template

You can select another template for the current patient:

1. Select ***TEMPLATE*** at the bottom of the monitor display or the touch panel.
2. A list of available templates and exam categories displays.

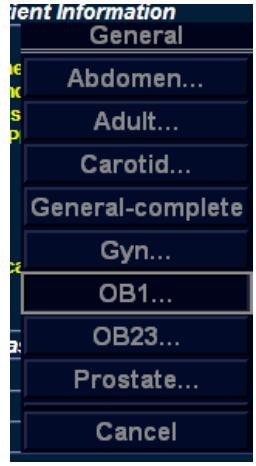



Figure 14-4. Application List Example

## Selecting another template (continued)

3. Select the desired template using the **Trackball** and press **Set**.

   The selected template displays on the monitor.

*NOTE: If you select another exam category, the template list of the selected category displays. Select the desired template.*

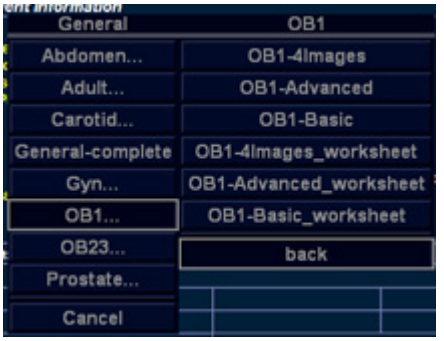



Figure 14-5. Available Template list

4. Select the desired template name and press **Set**.
5. The report changes to the selected template.

## Factory Templates

The system has factory templates for each application. You can modify these templates or create user-defined templates. You need to save revised/new templates with unique names.

A template may include one or more of the following:

- Measurements
- Worksheet or Vessel Summary Images
- Anatomical Surveys or Biophysical Profiles
- Anatomical Graphics
- Graphs
- Images areas
- Score Boxes

*NOTE: Additional factory templates can be added from the Utility-->Report menu (OB for multiple gestation, Renal, etc.).*

## Editing a Report

### Entering the hospital address

When using a factory template, the area for the hospital information is usually placed in the upper portion of the report.

To make a new area, see ‘Fixed Text’ on *page 14-49* for more information.

To modify the factory template:

1. Select ***Reports***.
2. Select ***Designer***.
3. Double-click on the area for the hospital information in the template. The Fixed Text dialogue box displays.

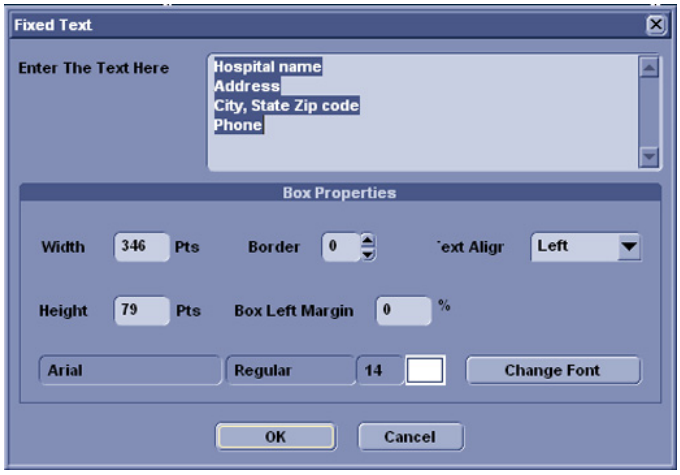



Figure 14-6. Fixed Text Dialogue Box

4. Make changes as necessary.
   a. Enter the hospital address in the text area.
   b. Modify Box Properties (box width, box border line width, text align, box height, box left margin, and font).
5. Select ***OK***.

## Entering the hospital address (continued)

6. Save the template.

   To keep the same template name:

   - Select ***Save*** from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and appends “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select ***Save As*** from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and appends “[user]”. For example, NewReport[user].

7. Exit the Report Designer. The report with the hospital address displays.

## Inserting the hospital logo

When using a factory template, the area for the logo is usually placed in the upper left portion of the report.

To make a new area, see ‘Fixed Text’ on *page 14-49* for more information.

To modify the factory template:

1. Save the preferred hospital logo in either a jpeg or bmp format on the removable media.

*NOTE:* *Label the logo with a unique name (e.g. HospitalNameLogo.bmp). If the different logo is printed on the report, rename the logo image you want to use and insert it into the report template again.*

2. Insert the removable media.
3. Select ***Reports***.
4. Select ***Designer***.
5. Double-click logo box at the left top so that the frame is highlighted. The logo box displays.

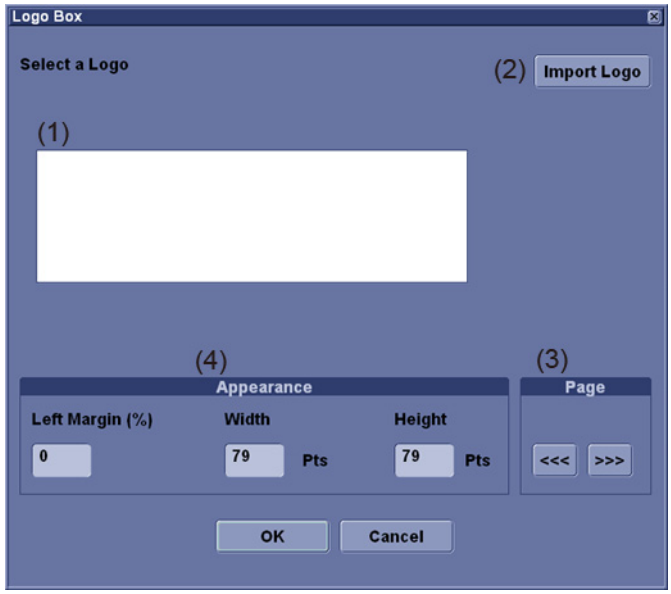



Figure 14-7. Logo Box

## Inserting the hospital logo (continued)

6. Select Import Logo (1). Select the removable media first and then the hospital logo.
7. Select ***OK***. The hospital logo displays in the logo list (2). Click the logo to select.

*NOTE: Scroll the logo list using the left/right arrow key (3).*

8. Modify Appearance (4).
9. Select ***OK***.
10. Save the template.

    To keep the same template name:

    - Select ***Save*** from the File menu, and press **Set**. The Save Template dialog box opens.
    - Select ***Yes***. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

    To save the template with a new name:

    - Select ***Save As*** from the File menu, and press **Set**. The Save Template As dialog box opens.
    - Enter the name of the new template, and press **Set**. The template receives the new name and adds “[user]”. For example, NewReport[user].

11. Exit the Report Designer. The template with the hospital logo displays.

*NOTE: If a different logo prints on the report, rename the logo image which you want on the report and insert it into the report template again.*

## Changing the Archive Information

When using a factory template, the Archive Information is usually placed below the hospital name and logo.

The contents of the Archive Information is inserted through the related page automatically. If you want to change the description, such as Information or Comments that was entered in the patient menu:

1. Double-click the yellow text to be changed, e.g. Information or Comments.

   The area where the description was entered (e.g. Patient menu) displays.
2. Change the existing data as necessary.
3. Select ***Report*** to return to the report.

Figure 14-8. Patient Information Area (Example)

## Modifying the displayed objects of Archive Information

1. Select ***Designer***.
2. Double click on the area for the Archive Information in the template. The Archive Information Box displays.

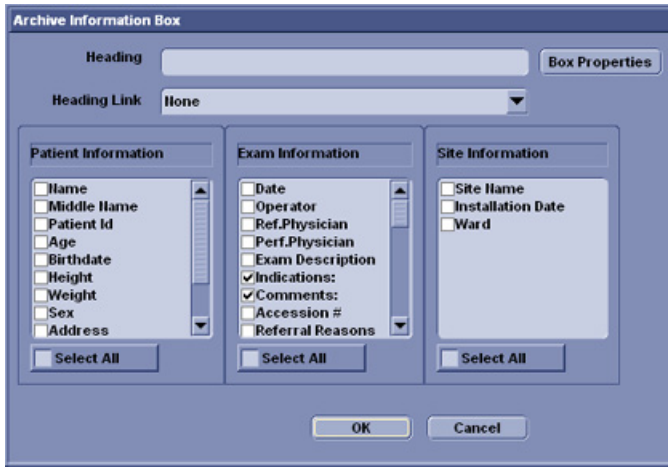



Figure 14-9. Archive Information Box

3. Click the checkboxes to select and deselect the objects.
   Objects with checkmarks will appear in the report template.
4. Select Box Properties to change the font, font size, font color, or box size, and select ***OK***.
5. Select ***OK*** to return to the Report Designer.

## Modifying the displayed objects of Archive Information (continued)

6. Save the template.

   To keep the same template name:

   - Select ***Save*** from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select ***Save As*** from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and adds “[user]”. For example, NewReport[user].

7. Select File -> Exit to leave the Report Designer.

## Entering free text

You can enter free text to the report using the alphanumeric keyboard.

The factory template terms their text area as “Summary or Comments”.

1. Move the cursor to the text field and press **Set**.

*NOTE: You can enter the text only to the field set as free text in the Report Designer.*

*NOTE: DO NOT enter “%s” in a free text field and then try to edit/ save the template in the Report Designer.*

2. Type the text.

## Inserting Text

1. Select **Designer**.
2. Move the cursor where the text is to be inserted and press **Set**.
3. Select the Text Field from the Insert menu. The Text Field dialog box displays.

Figure 14-10. Text Field Dialogue Box

4. Select the appropriate display items:
   - Ref. Reasons: Retrieves this information from the Direct Report
   - Comments: Retrieves this information from the Comment field of the patient screen and the Exam Comment field of the worksheet.
   - Diagnosis: Retrieves this information from the Direct Report
   - Free Text 1 - 8

**Inserting Text (continued)**

5. Type the heading Text.
6. Modify box properties, the heading text and font, and data.
7. Select ***OK*** or Cancel.
8. Save the template.

   To keep the same template name:

   - Select ***Save*** from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select ***Save As*** from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and adds “[user]”. For example, NewReport[user].

### Inserting an image to the report

Some factory templates include an image area. If you want to insert or modify the image area, see ‘Image Display Fields’ on *page 14-41* for more information.

To insert images from clipboard into the image field of the report:

1. Move the cursor to the desired image on the clipboard.

*NOTE: The preview image appears when the cursor is over a clipboard image.*

2. Press and hold down the **Set** key and drag the selected image to the report by using the **Trackball** or double click the **Set** key on the desired image.
3. To move images between image areas, press and hold down the **Set** key and using the **Trackball**, drag the selected image to the new location.

   To remove an image from the report, press and hold down the **Set** key and using the **Trackball**, drag the select image back to the clipboard.

## Measurement result section

Measurement results for the current patient display automatically if you have the measurement section in the report template.

The factory template has an appropriate measurement result area. If you want to insert or modify the measurement area, see ‘Measurements’ on *page 14-47* for more information.

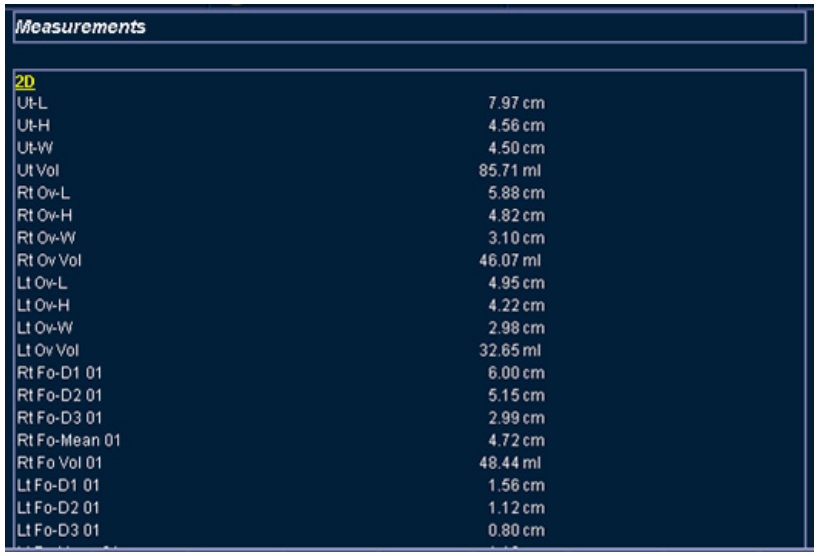



Figure 14-11. Measurement section

## Inserting the worksheet

You can insert the worksheet (like you can insert an image) to the image display field. To set an image display field in the report template, see 'Image Display Fields' on *page 14-41* for more information.

1. Display the worksheet on the monitor display.
2. Save the worksheet using the **Print** key.
3. Press ***Report***.
4. Drag the worksheet into the report.
   a. Move the cursor to the desired worksheet on the clipboard.
   b. Press and hold down the **Set** key. Use the **Trackball** to drag the selected worksheet into the Image Display Field.
   c. Release **Set**.

*NOTE: You can also move the cursor to the desired worksheet on the clipboard, double-click the worksheet, move the cursor to the Image Display Field, and select **Set**.*

5. The worksheet displays on the report.

*NOTE: You can double-click the worksheet in the report to change the background color to white to save ink during printing. Double-click the worksheet again to return the worksheet to the original color.*

## Placing objects side-by-side

If you want to place images, the image and comment, anatomical graphic and comment, etc. side-by-side, you must first place a table, which has two (or more) columns, into the report template.

1. Select ***Report***.
2. Select ***Designer*** to display the Report Designer.
3. Place the cursor where you want to insert the object.
4. Select ***Table*** from the Insert menu. Insert Table box displays.

Figure 14-12. Insert Table Box

5. Set the number of columns to 2 (or more, as required) and change the table parameters, if needed. Select ***OK***.

*NOTE: If you do not need a table border, set the Border to 0. Add additional rows if required.*

6. Place the cursor in the column and select the desired items from the Insert menu (e.g. logo, image, free text). Specify those items.
7. Repeat step 6 for each column as required.

## Placing objects side-by-side (continued)

8. Save the template.

   To keep the same template name:

   - Select ***Save*** from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select ***Save As*** from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and adds “[user]”. For example, NewReport[user].

You can insert the images in the order preferred, by row or column, on the factory templates. See ‘Inserting the Table’ on *page 14-33 for more information.*

## Accessing Worksheet, OB Graph and Anatomical Survey Pages

If the Worksheet, OB Graph, and/or Anatomical Survey pages have been saved for the current patient, you can access these pages from the report page.

*NOTE: OB Graph and Anatomical Survey pages apply only to OB.*

1. Select either ***Worksheet***, ***Graph*** or ***Anatomical Page*** on the touch panel.

*NOTE: There is also Fixed Text set up as hyperlinks for these pages. Cursor to the fixed text and press **Set**.*

2. The system displays the appropriate page (Worksheet, OB Graph or Anatomical Survey) with the corresponding touch panel.
3. Select ***Report*** to return to the Report page.

## Retrieving an Archived Report

1. Select ***Retrieve***. The Retrieve menu displays.

Figure 14-13. Retrieve Menu (Prefix “User1\” may not appear)

2. Select the desired report and press **Set**.

*NOTE: The retrieved report cannot be edited.*

## Deleting a Report from Archive

1. Select ***Delete***. The Retrieve menu appears on the screen.

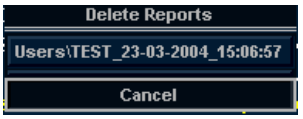



Figure 14-14. Delete Reports Menu (Prefix “User1\” may not appear)

2. Select the report to delete and press **Set**.

## Printing the Report

To preview the Print Layout before printing, see ‘Preview the Print Layout’ on *page 14-30* for more information.

1. Select ***Print*** to print out the report.

   The Report is printed on the default printer.

*NOTE: Double-click the worksheet and/or image in the report to change the background color to white A white background will save ink during printing. Double-click the worksheet or image again to return to the original color.*

## Storing the Report

1. Select ***Store***.

   The Report is saved as a CHM file to Archive.

*NOTE: The archived report cannot be edited; therefore, it is recommended that the data is carefully reviewed before the report is saved.*

## Exporting the Report to Media

Reports can also be saved in a user-defined locations in the following formats:

- Compiled HTML (.CHM) files: readable from any web browser.
- Portable Document Format (.PDF) files: readable with Adobe Acrobat reader.

1. Select ***Save As***.

   The Save As dialog box appears on the screen.
2. Enter the Report title in the File Name field.
3. Select the media to export the Report.The system supplies a name (numeric DICOM UID, unique identifier).
4. Select PDF or CHM from the Save as type pull down menu.
5. Select ***Save***.

## Exiting the report

1. Select ***Store*** to save the report.

*NOTE: If the user is working on a report and leaves the report screen for any reason, all information added to the report is automatically saved without loss of data.*

2. Select another key to close the report page.

# Designing Your Own Template

## Template Designer

You can design and create your own customized template from a blank template page, or you can use an existing template (factory or user-defined) and save the changes.

Display the desired template and select ***Designer*** to open the Template Designer page.

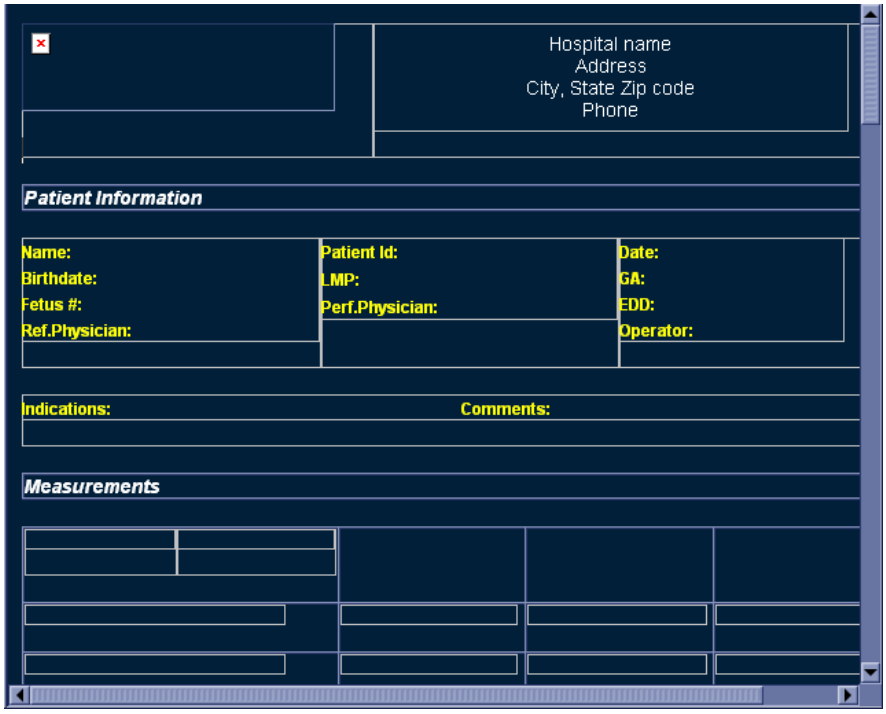



Figure 14-15. Report Designer

## File Menu

Table 14-2: File Menu

| | Description |
|---|---|
| New | Creates a new template. A blank template appears. |
| Save | Overwrites the existing template. |
| Save As | Saves as a new name. |
| Page Setup | Enters Print Layout screen. |
| Print Preview | Executes print preview. |
| Exit | Exits Report Designer page. |

### Create a new template

To design a new template without using a pre-existing factory template:

1. Select ***Designer*** to open the Report Designer.
2. Select ***New*** from the File menu, and press **Set**.
   The blank template displays.
3. Create the report template as needed.
4. Select ***Save*** from the File menu, and press **Set**.
   The Save Template As dialogue box displays.
5. Enter a template name and click ***OK***.
6. To exit Report Designer, select **Exit** from the File menu, and press **Set**.
   - Yes: Saves changes and exits Report Designer.
   - No: Does not save changes and exits Report Designer.
   - Cancel: Returns to Report Designer.

### Create a new template and save as a factory template name

To design a new template by modifying an existing factory template and keeping the same name of the factory template:

1. Select and display the existing factory template.
2. Select ***Designer*** to open the Report Designer.
3. Modify the report template as needed.
4. To save changes, select **Save** from the File menu, and press **Set**.

   The Save Template dialog box displays.

   - Yes: Saves changes.
   - No: Does not save changes.
   - Cancel: Returns to Report Designer.

*NOTE:* *The template name displays in the template list, retains the same name, and adds "[user]". For example, "OB23-Basic[user]". You do not lose the original factory template.*

5. To exit Report Designer, select **Exit** from the File menu, and press **Set**.

   - Yes: Saves changes and exits Report Designer.
   - No: Does not save changes and exits Report Designer.
   - Cancel: Returns to Report Designer.

HINTS

Save changes frequently as you modify your template. Saving often reduces the risk of losing all your changes.

### Create a new template and save with a new name

To design a new template by modifying or copying an existing factory template and saving it with a new name:

1. Select and display the existing factory template.
2. Select ***Designer*** to open the Report Designer.
3. Modify the report template as needed.
4. Select ***Save as*** from File menu and press **Set**.
   The Save Template As dialog box displays.
5. Type the new template name and click OK.
6. Select ***Exit*** from the File menu and **Set**.
7. The Report Designer closes and returns to the Report Page.

*NOTE: The template receives the new name and adds "[user]". For example, NewReport[user].*

### Page Setup

1. Modify the factory template as necessary in **Designer**.
2. Select **Page Setup** from File menu and press **Set**.
3. Change the paper size or orientation to fit the print layout, as necessary.
   To define the header and footer for the printed report, type text and enter the required variables listed in the table below. Select "Different for first page" and enter a specific header/footer for that page.

Table 14-3: Variable and Definition

| Variable | Definition | Variable | Definition |
|---|---|---|---|
| {pid} | Patient ID | {prt} | Current time (printing time) |
| {pnm} | Patient name | {cp} | Current page |
| {pbd} | Patient date of birth | {tp} | Page count |
| {exd} | Examination date | {c} | Subsequent text is centered |
| {prd} | Current date (printing date) | {r} | Subsequent text is right aligned. |
| {inm} | Institution name | | |

*NOTE: Default is left aligned. Report will appear as black ink on white background.*

## Page Setup (continued)

4. Select ***OK*** or Cancel.

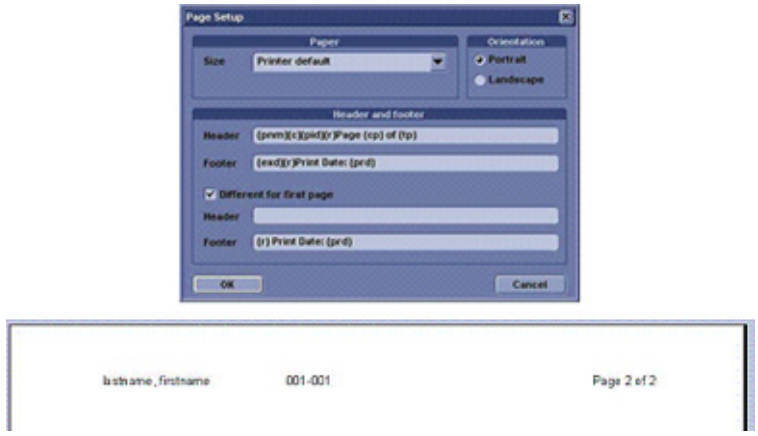



Figure 14-16. Page Setup with Header Example

## Preview the Print Layout

1. Select ***Template*** to choose the Report Template.
2. The Print Preview screen displays.

   If changes need to be made, select **Close** to exit the Preview page. Modify the template or return to the Report and modify the contents.

## Edit Menu

Table 14-4: Edit Menu

| | Description |
|---|---|
| Delete | Deletes the selected object from the report template. |
| Undo | Restores the previous state(s) of the report template. |

### Deleting a template object

1. Select the object to be deleted.
2. Select ***Delete*** from the Edit menu, and press **Set**. The object is deleted from the template.

### Undoing the operation

1. Select ***Undo*** from the Edit menu, and press **Set**.
2. Repeat as required.

## Insert Menu

Table 14-5: Insert Menu

| | Description |
|---|---|
| Page Break | Inserts a Page Break. |
| Table | Inserts a Table. |
| Logo | Inserts a Logo Bitmap File. |
| Archive Info | Inserts Archive Information. |
| Anatomical Graphics | Selects anatomical graphics by category to be inserted into a field. |
| Image | Inserts the image display field to the template. |
| Wall Motion Analysis | Selects Cut Planes, Bull's Eye, or Score Table Box. |
| OB/GYN | Selects OB Graph, Bar Graph or Anatomy. |
| Measurements | Inserts the measurement display field in the template. |
| Text Field | Edits text field. |
| Fixed Text | Enters any comments as Fixed Text. |

### Inserting the Page Break

1. Place the cursor where the Page Break is to be inserted and press **Set**.
2. Select Page Break from the Insert menu and press **Set**. The page break line displays on the template.

*NOTE: To edit the page break line, select the line and double click the **Set** key.*

## Inserting the Table

1. Place the cursor where the table is to be inserted and press **Set**.
2. Select Table from the Insert menu and press **Set**. The Insert Table dialog box displays.

Figure 14-17. Insert Table Dialog

3. Specify each parameter as required.

*NOTE: To set the table border as not visible, set "Border" parameter to 0 (zero)*

4. Select ***OK*** to insert the table or Cancel.

*NOTE: To insert/delete a row/column from the table or access table properties, double click the **Set** key in any empty area inside the table. A table menu appears with those options.*

### Inserting Images in a Table

You can choose the order in which images are inserted into tables: by row (default) or by column.

**Image Order by Row**

The system default inserts images in the cells of the first row, then to the next row.

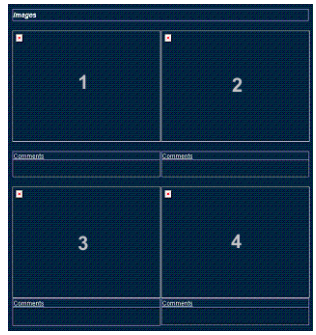



Figure 14-18. Image Order—Row Preference (System Default)

1. Follow the instruction for inserting a table. When specifying parameters, specify:

   No. of Columns=2; No. of Rows=2

2. After inserting the table, insert an image box in each cell of the table.

   a. Move the cursor to the first cell and select Insert -> Image.

   b. Repeat this step for each cell in the table.

After the template is saved and you are working in the ReportWriter, when you select images to be inserted in the table, they are placed in the default order.

**Inserting Images in a Table (continued)**

**Image Order by Column**

If you prefer to have the image placement by column, images are inserted in each cell of the first column, then the next column.

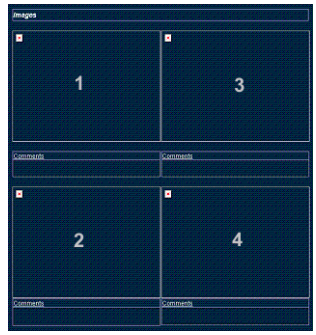



Figure 14-19. Image Order—Column preference

In order to achieve the collumn preference, you need to create a table with 2 columns and 1 row. In each cell of this table, you need to insert another table.

1. Follow the instructions for inserting a table. When specifying parameters, specify:

   No. of Columns=2; No. of Rows=1
2. After inserting the table, create a table inside each of the existing table's cells.
   a. Move the cursor to the left column's cell and press **Set**.
   b. Select Table from the Insert menu and press **Set**.
   c. When specifying parameters, specify:

      No. of Columns=2; No. of Rows=1; Width=290 pixels.

      Select ***OK***.
   d. Repeat steps a-c for the next column.
3. Insert an image box to each table cell.
   a. Move the cursor to the first cell and select Insert -> Image.
   b. Repeat this step for each cell in the 2 tables.

After the template is saved and you are working in the ReportWriter, when you select images to be inserted in the table, they are placed with your column preference.

## Inserting Logos

1. Place the cursor where you want to insert the logo and press **Set**.
2. Select Logo from the Insert menu and press **Set**. The Logo Box displays.
3. Select a logo that you want to insert (1) or import a bmp or jpg file from the removable media (2). Scroll the images using the arrow key (3). Specify the appearance (4).

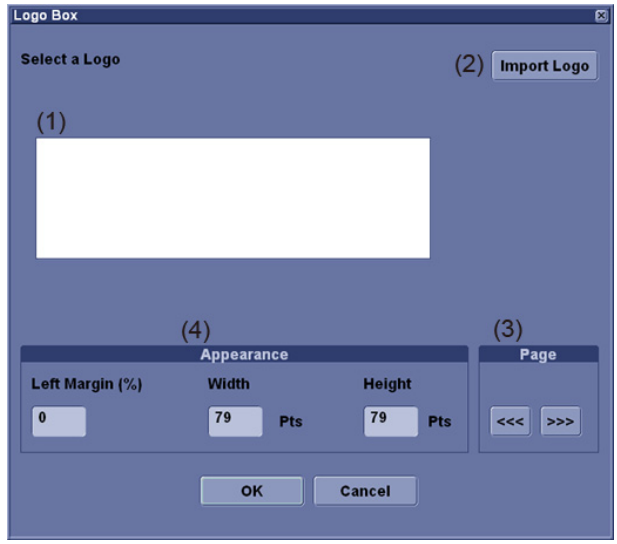



Figure 14-20. Logo box

4. Select ***OK*** to insert the logo or Cancel.

***Changing a logo:***

1. Place the cursor on the logo to be changed and press **Set** twice. The Logo Box displays.
2. Select a different logo. If the desired logo is not shown, select Import Logo to import a different logo.
3. Specify the appearance.
4. Select ***OK*** or Cancel.

## Inserting Archive Information

Archive information contains all the objects from the different information menus (Patient, Exam, and Site Information). This box accumulates different information menu selections that can be grouped together and displayed in one table.

1. Place the cursor where you want to enter the archive information and press **Set**.

   If you use a factory template, double click on the current archive information area to display the Archive Information Box.

2. Select ***Archive Info*** from the Insert menu and press **Set**. The Archive Info Box displays.

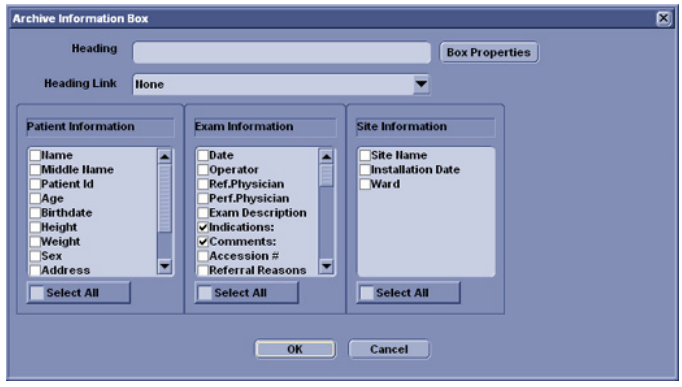



Figure 14-21. Archive Information Box

3. Type the Heading, select a heading link from the pull-down menu, and select the parameters you want to display in the report.

## Inserting Archive Information (continued)

4. Select Box Properties to change the Font, Alignment, Appearance, etc.

*NOTE: To set the same font to all fields, select Set All fields.*

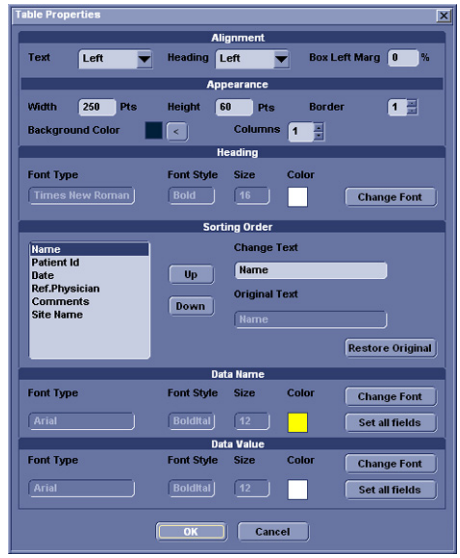



Figure 14-22. Table Properties

5. Select ***OK*** or Cancel. The contents of the Archive Information is inserted to the related page automatically.

Figure 14-23. Patient (Archive) Information Example

## Inserting Archive Information (continued)

***Editing displayed Archive Information:***

1. Select ***Designer***.
2. Move the cursor to Archive Information field to be edited.
3. Press **Set** twice. The Archive Information Box displays.
4. Edit the heading, the Heading Link and Information parameters, as necessary.
5. Select ***OK*** to save or Cancel.

## Anatomical graphics

1. Place the cursor where you want to insert the Anatomical Graphics and press **Set**.
2. Select ***Anatomical Graphics*** from the Insert menu.

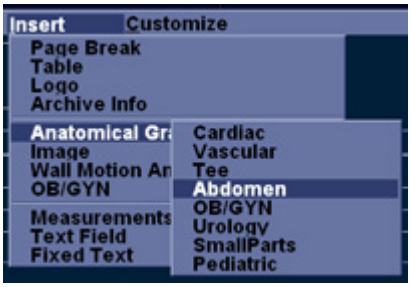



Figure 14-24. Anatomical Graphics Menu Example

3. Select the desired category and press **Set**. The graphic box displays.

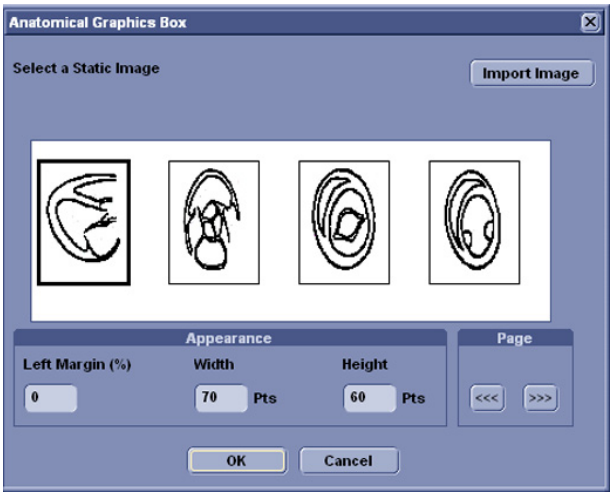



Figure 14-25. Anatomical Graphics Box Example

4. Select the graphic to be inserted to the template or import a bmp or jpg file from the removable media. Scroll the images using the arrow key.
5. Select Appearance.
6. Select ***OK*** or Cancel.

### Image Display Fields

1. Place the cursor where you want to insert the image.
2. Select  image from the Insert menu and press **Set**. The Ultrasound Image Box displays.

Figure 14-26. Ultrasound Image Box

3. Type the Heading text, modify the box properties, and change the heading text font, as necessary.

*NOTE:* *For no heading, type a Space in the Heading text.*

To keep the monitor image appearance, the ratio of width to height (W:H) should be 4:3. So, basically 640:480 for large images and 300:225 for two side-by-side images.

4. Select ***OK*** or Cancel.

### Cardiac Studies Wall Motion Analysis

1. Place the cursor where you want to insert the wall motion analysis and press **Set**.
2. Select Wall Motion Analysis from the Insert menu.

## Cardiac Studies Wall Motion Analysis (continued)

3. Select and set up the desired parameter.
   - Bull's Eye

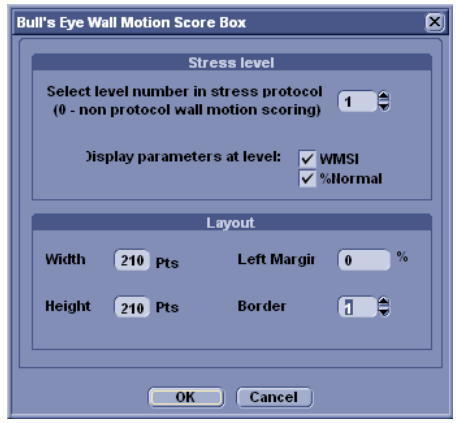



Figure 14-27. Bull's Eye Dialog Box

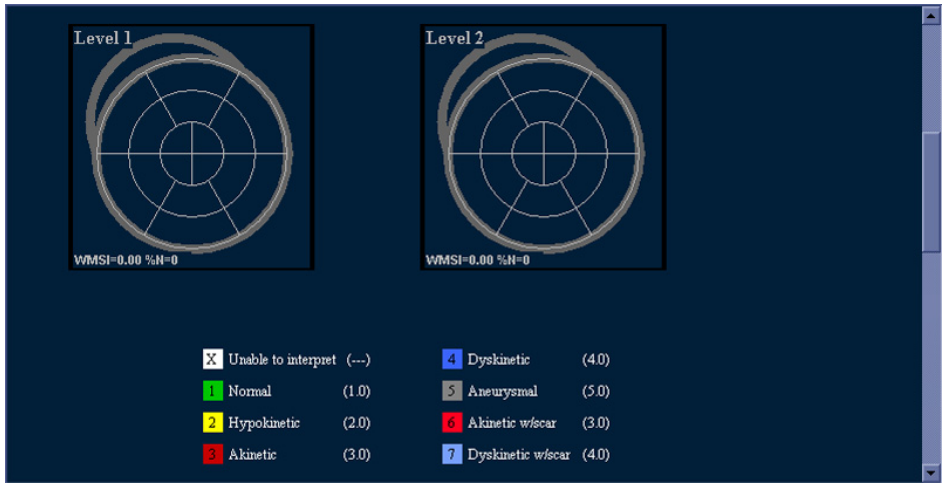



Figure 14-28. Bull's Eye Report Example

**Cardiac Studies Wall Motion Analysis (continued)**

- Cut Planes

*NOTE: The Cut Planes dialog box parameters are similar to the Bull's Eye Dialog Box shown previously.*

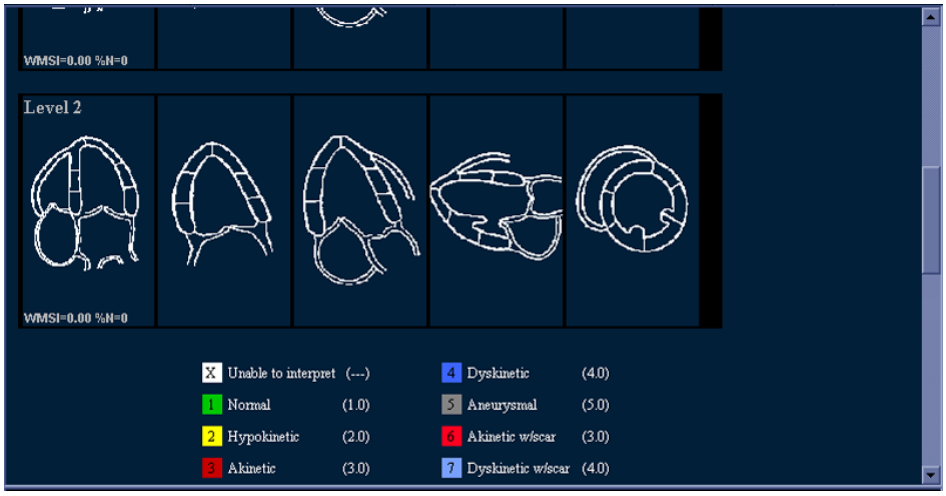



Figure 14-29. Cut Planes Report Example

- Score Table Box

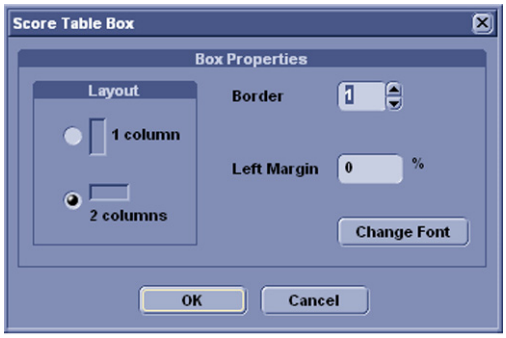



Figure 14-30. Score Table Box Dialog Box

4. After you finish the setup, select ***OK*** or Cancel.

## OB/GYN (OB and GYN Only)

The OB Graph, Bar Graph and Anatomy can be entered into the Report.

1. Place the cursor where you want to insert the graph or anatomy and press **Set**.
2. From the Insert menu, select OB/GYN. The selection menu displays.
3. Select the appropriate item as necessary. A dialog box displays.

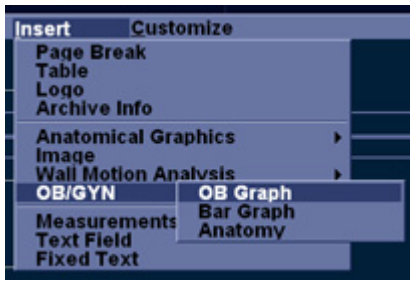



Figure 14-31. Selection Menu

- OB Graph

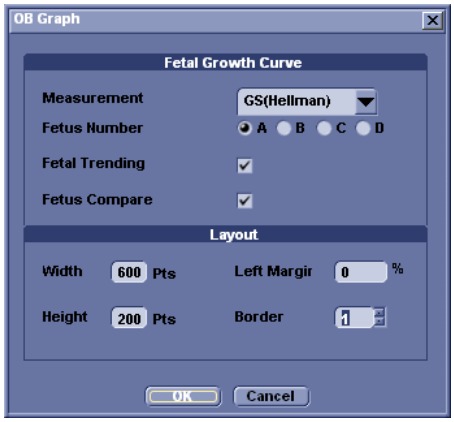



Figure 14-32. OB Graph Dialog Box

a. Select the Measurement and Fetus Number.
b. Check Fetus Trending and Fetus Compare, if appropriate.
c. Modify the Layout, if necessary.
d. Select ***OK***

**OB/GYN (OB and GYN Only) (continued)**

- Bar Graph

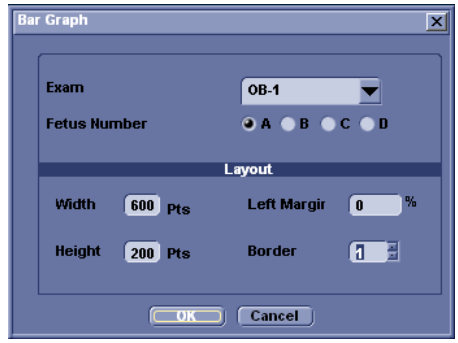



Figure 14-33. Bar Graph Dialog Box

a. Select the exam and fetus number.
b. Modify the Layout, if necessary.
c. Select ***OK***.

*NOTE: The Bar Graph already contains default application measurements.*

## OB/GYN (OB and GYN Only) (continued)

- Anatomy

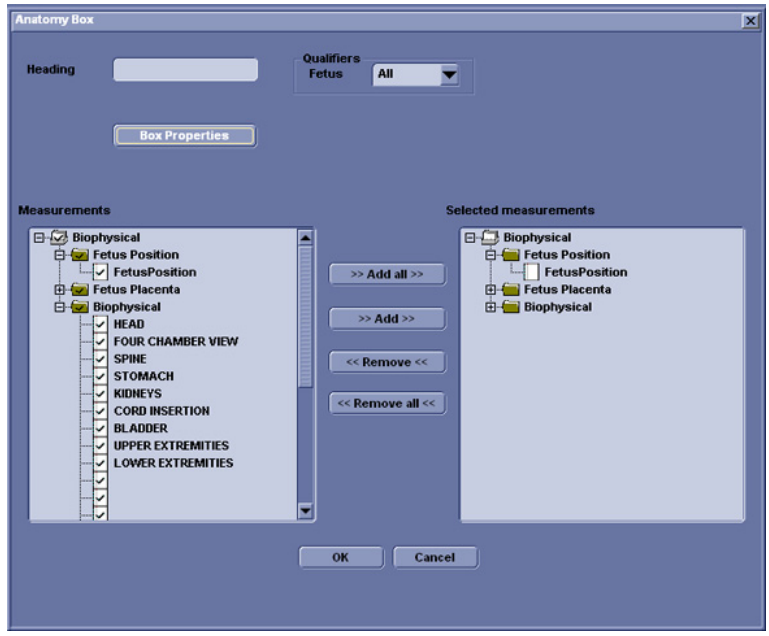



Figure 14-34. Anatomy Dialog Box

a. Type the Heading.
b. Select qualifiers from the pull-down menu.
c. Select "***Add all***" to copy all measurements to the right column
d. Check the box in front of the measurement you need in the left column and select "***Add***". The select measurements copy to the right column.
e. To remove measurements you do not need, check the boxes in front of those measurements in the right column, and select "***Remove***" or "***Remove all***".
f. If you want to modify the properties, select Box Properties and set required parameters.

## Measurements

Insert a field to display the measurements. The measured parameters displayed in the measurement display field are configured.

1. Place the cursor where you want to insert the measurement and press **Set**.
2. Select Measurements from the Insert menu and press **Set**. The Measurements Box displays.

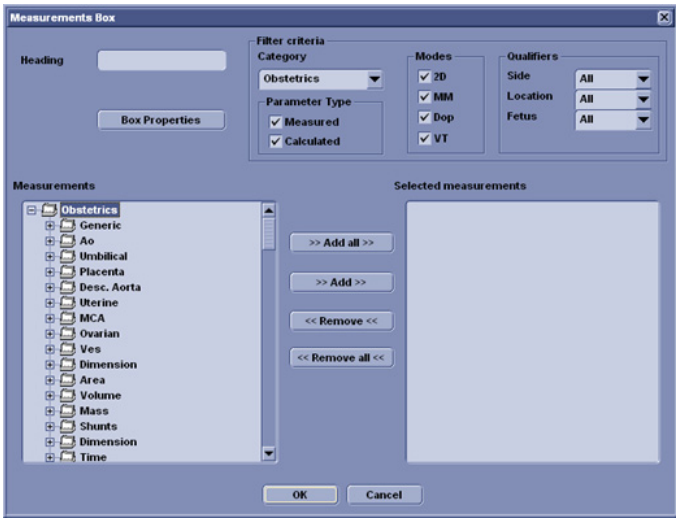



Figure 14-35. Measurement Box

3. Type the Heading text, select the Filter Criteria and measurements from the tree, as necessary.
4. Select ***OK*** or Cancel.

## Text Fields

1. Place the cursor where you want to insert the text and press **Set**.
2. Select Text Field from the Insert menu and press **Set**. The Text Field dialog box displays.

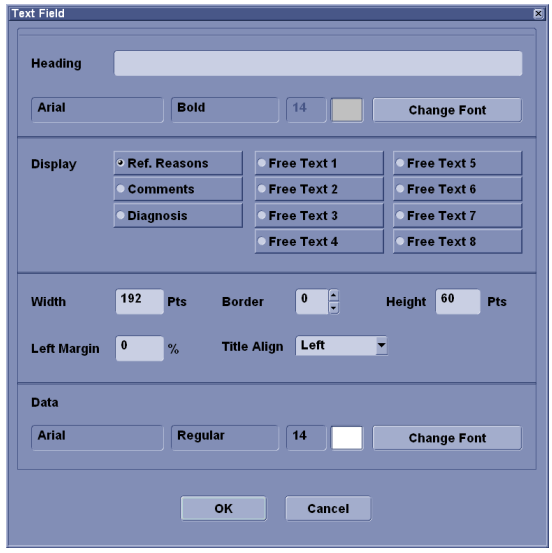



Figure 14-36. Text Field Dialog Box

3. Type the Heading Text. If you do not need the heading, type a space.
4. Select Display item.
   - Ref.Reason: Reason for Referral.
   - Comments: Gets information from the Comment field of the Patient screen and the Exam Comment field of the Worksheet.
   - Diagnosis.
   - Free Text: 1 - 8
5. Specify the border of the Text Field and Font as necessary.
6. Select ***OK*** or Cancel.

The text is saved automatically into the corresponding area selected on this dialog box.

## Text Fields (continued)

***Editing an existing text field:***

1. Move the cursor to the Text Field to be edited.
2. Press **Set** twice. The Text Field dialog box displays.
3. Edit the heading, the settings, or font, as necessary.
4. Select ***OK*** or Cancel.

## Fixed Text

1. Place the cursor where you want to insesrt the fixed text and press **Set**.
2. Select Text Field from the Customize menu and press **Set**. The Fixed Text dialog box displays.

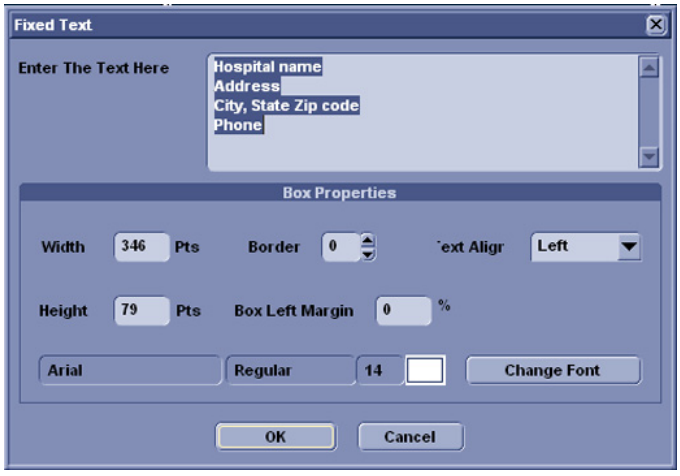



Figure 14-37. Fixed Text Dialog Box

3. Type the text (e.g. hospital information, report title, or table title) and specify the border and font.
4. Select ***OK*** or Cancel.

***Editing existing Fixed Text:***

1. Move the cursor to the Fixed Text to be edited.
2. Press **Set** twice. The Fixed Text dialog box displays.
3. Edit the text, the border or font, as necessary.
4. Select ***OK*** or Cancel.

## Customize Menu

Table 14-6: Customize Menu

| | Description |
|---|---|
| Page Color | Changes the template color. |
| Preference | The Preference menu for Archive Information field displays. |

### Page Color

1. To change the page color, select Page Color from the Customize Menu and press **Set**. The Color dialog box displays.

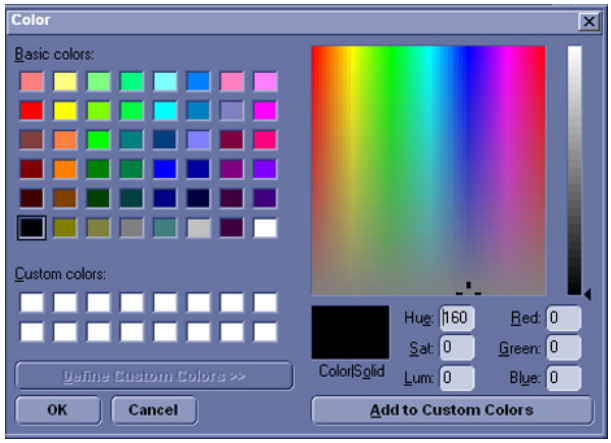



Figure 14-38. Color Dialog

2. Choose the desired color or create a new color.
3. Select ***OK*** or Cancel.

## Setting Preferences

To set preferences for the Archive Information:

1. Select Preferences from the Customize menu and press **Set**. The Preference Box displays.

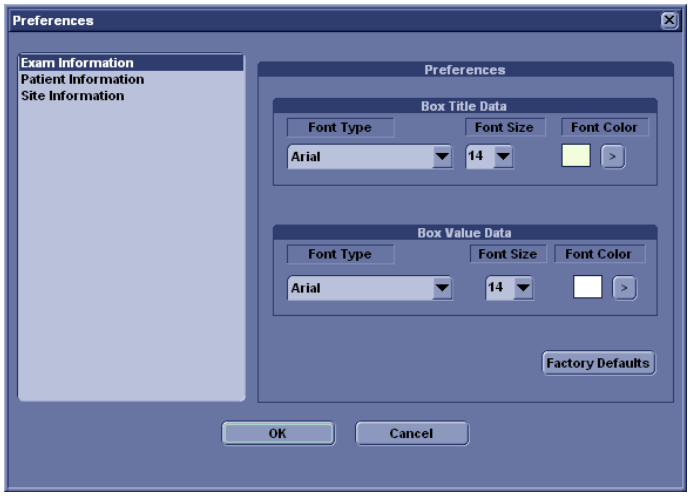



Figure 14-39. Preferences Box

2. Select the information to be modified and set the desired preferences.
3. Select ***OK*** or Cancel.
4. Save the template.

# Direct Report

## Direct Report

You can use Direct Report to enter Comments, Diagnosis, and Referral Reasons at any time during the examination that will be part of the final report. The comments are reflected on the Report if the Report is configured for those parameters.

1. Select ***Direct Rep.*** on the measurement Summary window.

Figure 14-40. Measurement Summary Window

## Direct Report (continued)

2. The Direct Report displays on the left side of the screen.

Figure 14-41. Direct Report

a. Select the type of information

*NOTE:* *Comments entered under Diagnosis appear in the Clinical Diagnosis section of the final report. Comments entered under Referral Reasons appear in the Referral Diagnosis section of the final report.*

b. Create/insert pre-defined text

c. Text field

d. List of measurements completed

The measurement results display on the Measurement Overview field.

Double Click: inserts value only for selected line, e.g. 5.98 cm

Shift + Double Click: inserts whole line for selected line, e.g. BPD 5.98 cm

e. Exits the Direct report

## Direct Report (continued)

3. Select the appropriate parameter and type the free text with the alphanumeric keyboard or use Insert Text.

*NOTE: You can configure the pre-defined text at the Utility Report screen.*

a. Select ***Insert Text*** to display the Insert Text Window.

b. Use the **Trackball** to select the text to be inserted.

c. Press **Set**. The selected text displays on the Direct Report.

Figure 14-42. Full Insert Text Window

- New: Enters the new text
- Edit: Edits the existing text
- Delete: Deletes the existing text
- More>>: Displays the Full Insert Text Window
- Close: Closes the insert text window
- <<Less: Minimizes the insert text window
- Move up/Move down: Moves the text up or down

4. Move the cursor over the measurement result displayed in the overview window, and double click the **Set** key.

## Direct Report (continued)

5. Select ***Done*** at the bottom of Direct Report to exit.

   If you configure the field of comment, diagnosis, referral reasons or Measurement on the Report, the text and/or measurement results entered in the Direct Report are automatically displayed on the Report.

Figure 14-43. Direct Report and Report (Example)

# Report Presets

## Utility Report Page

You can edit the report template and text on the Utility Report page.

### Templates

Left Column: The list of all templates (Factory Default, User defined, etc)

Right Column: The list of templates displayed on the template list.

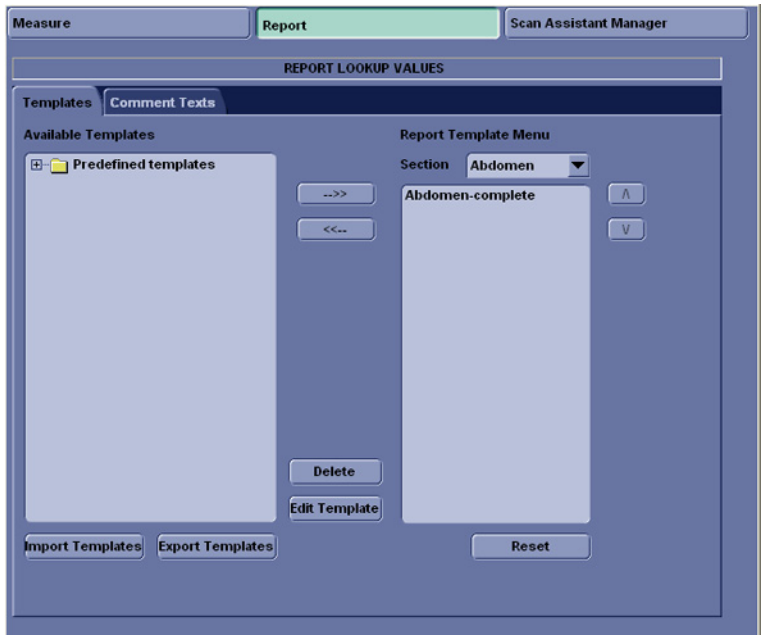



Figure 14-44. Report Template Tab

**Templates (continued)**

- To insert the template on the template list:
  a. Select the application which you want to insert into the template from the pull-down menu above the right columun.
  b. Select the category (categories) and/or the template(s) in the left column by the check the box.
  c. Select the right arrow to copy the template to the right column.
- To remove the template from the template list but not from the system):
  a. Select the template in the right column.
  b. Use the left arrow to remove the template from the right column.
- To edit the template or to make a new template:
  a. Enter Utility -> Report -> Template tab.
  b. Select the appropriate template in the left column.
  c. Select ***Edit Template***. The Template Designer page displays.
  d. Edit the template and save or save as with a new name.

  If you use Save As with a new name, the new template is added to the left column. See ‘Designing Your Own Template’ on *page 14-26 for more information.*
- To delete the template:
  a. Select the template to be deleted.
  b. Press ***Delete***.

## Templates (continued)

- To export the template:

HINTS

Export templates to removable media (CDs, DVDs, USBs) so, at a later time, you can import those templates to a system. Export only works on templates, not data.

a. Insert the removable media in the drive.

b. Move the cursor to “Export Templates” and press **Set**. The available user-defined templates display in the Export Templates window.

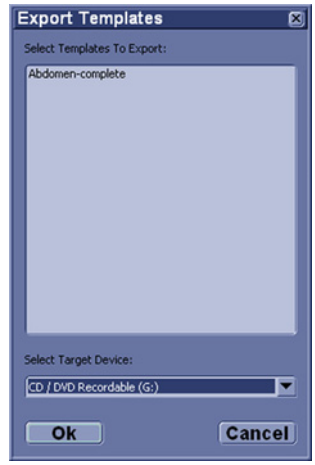



Figure 14-45. Export Templates

c. Select the template(s) to be exported.

*NOTE: To select multiple templates, use the **Ctrl** or **Shift** keys.*

d. Select the desired removable media under the Select Target Device field.

e. Select ***OK***.

f. Press ***F3*** to eject the media.

**Templates (continued)**

- To import the template:

*NOTE: Import only works on templates, not data.*

a. Insert the removable media with the report template(s) to be imported.

b. Select ***Import Template***. The Import Template window displays.

Figure 14-46. Import Templates

c. Select the Source Device from the pull-down menu. Select ***OK***.

d. Press ***F3*** to eject the media.

*NOTE: Imported templates are stored in the User defined templates\General directory.*

- To move the template from the left column to the right, or from the right to the left:

a. Select the template to be moved.

b. Select the Right Arrow or Left Arrow button.

- To move the template up or down in the right column:

a. Select the template to be moved.

b. Press the Up Arrow or Down Arrow button.

## Comment Texts

You can edit the comment text on the Comment Texts tab.

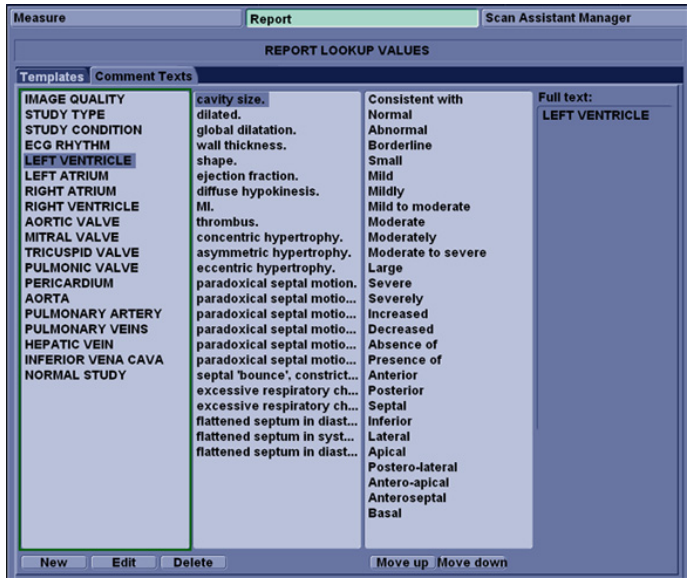



Figure 14-47. Comment Texts Tab

- New: Enters the new comment.
- Edit: Edits the existing comment.
- Delete: Deletes the existing comment.
- Move up/Move down: Moves the comment up or down.

## Backup/Restore Report Templates

Backup moves templates to removable media (CDs, DVDs, USBs).

Restore moves templates, that were backed up onto media, to the LOGIQ S7 Expert/Pro with the same software version.

*NOTE: To move reports with patient data, use Backup/Restore Report Archive and Patient Archive.*

To backup the report template:

1. Select ***Utility***.
2. Select ***System*** and select the Backup/Restore tab.
3. Select the media.
4. Check User Defined configuration box of the Backup field.
5. Select ***Backup***.
6. Select ***Save*** and eject the media.

To restore the report template:

1. Insert the media.
2. Select ***Utility***.
3. Select ***System*** and select Backup/Restore tab.
4. Check Report Template box of the Detailed Restore of User Defined.
5. Select ***Restore***.
6. After the system reboot, select ***Utility*** and ***Report***.
7. Select the Template tab.
8. Select the appropriate template (See ‘Templates’ on *page 14-56 for more information.*)

For preset specifcs, see Chapter 16.

# *Chapter 15*

# Recording Images

*Describes how to record images.*

# Introduction

## Overview

A typical workflow for connectivity might be as follows (this setup varies by each user setup):

1. Select the dataflow, worklist for example.
2. Start a new exam. Select the patient.
3. Perform the patient scan.
4. Store images as multi-frame CINE Loops and Raw DICOM data via the **P1** key.
5. Store secondary capture for DICOM print via **P2** key.
6. Store images to the color printer or B/W printer via **P3** key.
7. Check the DICOM Job Spooler via ***F4*** to verify delivery.
8. End the exam.
9. Permanently store images via the Patient menu.

## Overview (continued)

During an examination, the operator stores data, images and cineloops for immediate purposes. The LOGIQ S7 Expert/Pro includes an integrated patient archiving system for data and image storage.

The LOGIQ S7 Expert/Pro enables also storing of data and images to external databases (Network Server, removable media).

Dataflow combines archive, data, DICOM, and onboard records into one coherent workflow. Destination devices are configured and assigned to the print keys. You select the appropriate dataflow (Portable, etc.) according to your requirements. You manage the patient database (local, shared, or via a worklist broker).

- DO NOT use the internal hard drive for long-term image storage. Daily backup is recommended. External storage media is recommended for image archive.

*NOTE:* *DICOM images are stored to external media storage devices separately from patient data, which also needs to be backed up to a dedicated database-formatted external storage media.*

- If working off-line with a dataflow pointing to a DICOM server, the images stored during the examination may have to be manually resent in the DICOM spooler when reconnecting the unit. Resend all jobs that failed or are on hold.

  In addition, stored images and cineloops can be saved to a removable media in the standard formats JPEG, MPEG, AVI and DICOM.
- You need to set up a process for locating images stored to external storage media for easy recall
- GE Healthcare IS NOT responsible for lost data if you do not follow suggested back-up procedures. GE Healthcare WILL NOT aid in the recovery of lost data.

Refer to the Customizing Your System chapter for instructions on seting up your system’s connectivity.

## Adding Devices

To add a destination device (printer, worklist server, etc.) to this system, see ‘Device’ on *page 16-90*.

To verify a DICOM device, see ‘Device’ on *page 16-90*.

## Adding a Dataflow

To add a new dataflow to this system, see ‘Dataflow’ on *page 16-110*.

## Adding Devices to a Print Button

To add devices/dataflows to a print button, see ‘Button’ on *page 16-111*.

## Formatting Removable Media

To format removable media, see ‘Formatting removable media’ on *page 16-114*.

# Storing Images and Cineloops

Images and cineloops that are stored during a current examination are displayed as thumbnails on the clipboard.

When an image is stored, all the additional information that is displayed is saved with it (i.e. probe and application selected, image setting, annotations or measurements).

See for detailed settings related storing image/Cine.

The image archive is set by the dataflow selected (See for more information.)

## Storing an image

To store an image,

1. While scanning, press **Freeze**.
2. Scroll through the CINE Loop and select the desired image.
3. Press the appropriate Print key.

   The selected image is stored (per your preset instructions) and a thumbnail is displayed on the clipboard.

*NOTE: LOGIQ S7 Expert/Pro numbers the images which are saved in the Local Archive (Instance Number). But Instance Number may change or get duplicated when adding/deleting images to the exam. So for identification, the recommendation is to use Content Date/Content Time on the DICOM server instead of Instance Number.*

## Storing a CINE Loop

A CINE Loop is a sequence of images recorded over a certain time frame. The stored CINE Loops are displayed chronologically on the clipboard.

CINE Loops can be stored at any time during scanning. You can choose to preview the CINE Loop before storage and save the CINE Loop directly, as described below.

Refer to ‘Print Controls’ on *page 16-78* about the setting.

*NOTE: LOGIQ S7 Expert/Pro numbers the images which are saved in the Local Archive (Instance Number). But Instance Number may change or get duplicated when adding/deleting images to the exam. So for identification, the recommendation is to use Content Date/Content Time on the DICOM server instead of Instance Number.*

### Previewing and Storing a CINE Loop

1. While scanning, press **Freeze**.
2. Determine the best CINE Loop to store.
3. Play the CINE Loop to review it.
4. Press the appropriate Print key.

Depending on whether the system has been configured to enable or disable “Preview Loop before store” (see ‘Print Controls’ on *page 16-78*), the following procedures enable the CINE Loop to be stored directly.

## Storing a CINE Loop (continued)

### Storing a CINE Loop Without Preview

If “Preview Loop before store” is disabled,

1. While scanning, press the appropriate Print key.
2. The last valid CINE Loop is stored in the archive and a thumbnail is displayed on the clipboard.
3. Scanning resumes immediately.

### Storing a CINE Loop With Preview

If “Preview Loop before store” is enabled,

1. While scanning, press the appropriate Print key.
2. The last valid CINE Loop is previewed.
3. Adjust the CINE Loop, as necessary.
4. Press the appropriate Print key.

   The movie clip thumbnail is displayed on the clipboard.

**Preview**

Loop Preview can now be enabled independently for Time -Based Store, ECG-Based Store, and Mark CINE. This is useful for setting preview preferences based on the application.

*NOTE: The Contrast Time Span setting overrides the Time Span when in Contrast Mode.*

# Image/Data Management

## Reviewing Patient Images

Please refer to Chapter 4 for more information on the following:

- Retrieving and editing archived information
  - Searching for a patient
  - Reviewing a patient exam
  - Reviewing an image
  - Deleting a patient, exam, or image

## Backup/Restore Images

Please refer to ‘Backup and Restore’ on *page 16-33* and ‘EZBackup and EZMove’ on *page 16-37* for detailed information.

## Clipboard

The clipboard displays thumbnail images of the acquired data for the current exam. Images from other exams are not displayed on the current patient's clipboard.

*NOTE: If you have unsaved images in the clipboard and change the exam, the dialogue "You have unstored images. They will be saved to your current exam" displays. The unsaved images are saved to the current exam.*

All of the images can be viewed in the Active Images screen or in the Image History screen, available from the display or from the Patient menu.

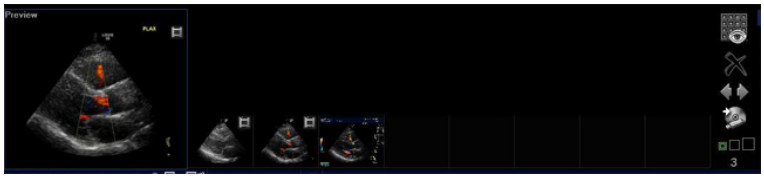


Figure 15-1. Clipboard

### Saving the image /cine to the Clipboard

The active image/cine is stored and placed on the clipboard when you press the print key (this assumes that you have already set up a print key to do this). The clipboard contains preview images with enough resolution to clearly indicate the contents of the image. CINE Loops are indicated by a movie clip icon.

The clipboard fills from left to right, starting in the left-hand corner. Once the top row is full, the second row starts to fill. Once both rows are full, the next image stored starts to fill a 'third' row (the first row disappears from the clipboard display, with the second row now becoming the first row, and the third row now becoming the second row).

### Previewing Clipboard Images

1. Select the Pointer key to obtain a cursor arrow.
2. Move the **Trackball** to position the pointer over the clipboard image you want to recall.
3. An enlarged preview of the image is displayed on the left-hand side of the monitor.

### Recalling Images from the Clipboard

To recall images from the clipboard,

1. Select the Pointer key to obtain a cursor arrow.
2. Move the **Trackball** to position the pointer over the clipboard image you want to recall.
3. Press **Set** to recall the image.
4. Press the left/right arrow of Menu icon to move to the previous/next image.

### To delete an image from the clipboard

1. If in images live, press **Freeze**.
2. Select the **Pointer** key to obtain a cursor arrow.
3. Place the cursor on the clipboard image you want to delete, then press **Set** to select the image.
4. Place the cursor on the Delete icon and press **Set**.

   A warning message is displayed asking the user to confirm the action to perform.
5. Select ***Yes***.

## Save As

Images and cineloops can be saved to a removable media or Network storage to View on a **Windows PC** in the following standard formats:

- Still images: JPEG, DICOM and RawDICOM (Raw data + DICOM)
- Cineloops: WMV, AVI, DICOM and RawDICOM (Raw data + DICOM)

Images can also be stored as MPEG format as described on ‘MPEGvue’ on *page 15-25*.

To save images to the media:

1. Insert the media into the drive or connect the USB drive to the system.

*NOTE: If you have not formatted the media, the media will be formatted when you select Save As.*

2. On the scan screen, press the left **Set** key. The arrow cursor displays.
3. Place the cursor on the image or CINE Loop in the clipboard to be saved and press **Set**. The image displays on the screen.
4. Select ***SaveAs*** in the lower, right-hand corner of the screen. The system menu displays.

*NOTE: If you save the image as an .avi file, run the CINE Loop before you select SaveAs.*

*NOTE: You cannot save a 2D cineloop image as a .jpeg file.*

## Save As (continued)

5. Select Save As. The Save As menu appears.

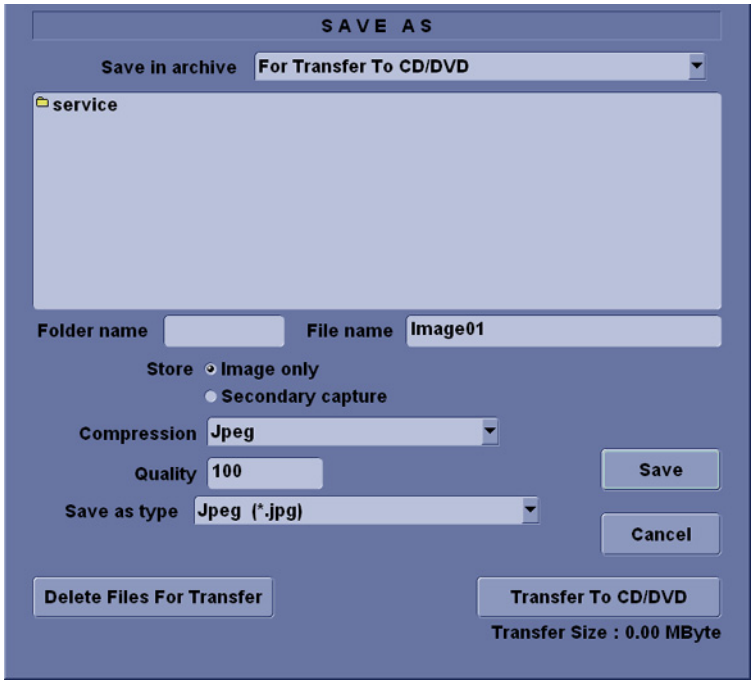



Figure 15-2. Save As Menu

6. Select the media from the Save in Archive pull-down menu.
7. Folder name: You can create the folder for the saved file.
   - Default is blank (The folder is not created)
   - Max 32 characters

*NOTE: You cannot edit the folder name when the folder is opened.*

8. File Name: The name of the file is automatically filled in, but you can type a file name as well.
   - Max 64 characters

*NOTE: DO NOT use the following special characters when saving images: !, @, #, $, %, ^, &, *, (, ), |, :, ;, <, >, ?, /, ~, [, ], {, }, and Yen sign.*

## Save As (continued)

9. Store: Select Image only or Secondary capture.
   - Image only: Saves only the ultrasound image area
   - Secondary capture: Saves the ultrasound image area, title bar, and scan information area. Not available for DICOM or RawDICOM images.

*NOTE: If you select "WMV" for Save as type, Secondary capture is disabled.*

10. Compression: Specify Compression.
    - None
    - Rle
    - Jpeg
    - Jpeg2000

*NOTE: If you select "WMV" for Save as type, Compression is disabled.*

11. Quality: Specify image quality (between 10-100). A high quality setting gives a lower compression.

*NOTE: If you select "WMV" for Save as type, Quality is disabled.*

12. Save as type: Select one of the following.
    - RawDICOM: saves the still image or CINE Loop in both GE raw format and DICOM format.
    - DICOM: saves the still image or CINE Loop in pure DICOM format.
    - AVI: Saves the CINE Loop in avi format.

*NOTE: Store "Image Only" is available if you select AVI for Type.*

    - JPEG: Saves the still image in jpeg format.
    - WMV: Saves in Windows Media Format.

*NOTE: WMV type is only available with CINE loop image.*

    - JPEG2000: Saves the still image in jpeg2000 format.

    If you want to see all data saved onto the HDD, select "AllFiles(.*)". All the data names display in the window.

*NOTE: The Save button is disabled when you select "AllFiles". Select each Save as type when you want to save data.*

## Save As (continued)

13. Press ***Save***.

    The images are saved directly to the USB drives or Network storage whenever you press Save.

    If you select “For Transfer to CD/DVD”, the images are saved to the HDD buffer.

    - If free space of the destination is not enough to save all selected images, then warning dialog appears.
    - If the same file name is existed in the destination, the warning dialog displays.

      ***OK***: Overwrite file and continue to save selected images.

      ***Cancel***: Cancel save images.

14. Repeat this step for as many images/clips you want to save.
15. After you have added all of the images/loops you want to save and are ready to write to the media, transfer all the images at the same time. Press Save As--> Transfer To CD/DVD.

    A progress bar lets you know that the “Media transfer is in progress.”

    If total transfer size is bigger than CD/DVD free space size, then only the files that can be copied to CD/DVD are transferred. After the copy is finished, the warning dialog displays. Warning dialog shows total required file size and transferred file size. Press ***OK*** and you need to change CD/DVD and press ***Transfer to CD/DVD*** again.

## Save As (continued)

16. If you do not want to save the image to CD/DVD, select "***Delete Files for Transfer***" All images are deleted.
17. Press **F3** to eject the media. Select CD/DVD Recordable or USB drive. Select ***Yes and Verify files*** for CD/DVD. This compares the expected number of files with the actual number of files on the media. The files are also checked to ensure that they are readable.

*NOTE: The Report Save As feature is somewhat different. As soon as you select to save a report, the report is saved.*

*NOTE: If you save 3D image as an AVI file, an annotation text "COMP" appears at the top of the saved image which represents the compressed image.*

*NOTE: Time line image can be saved as multi frames image with SaveAs. 3D images can't be saved with WMV format.*

Table 15-1: Save As Formats

| | .avi format | .wmv format | MPEGvue in Data Transfer |
|---|---|---|---|
| B, B+CF | Multi frames | Multi frames | Multi frames |
| B+Dopploer | Single frame | Multi frames | Single frame |
| B+M | Single frame | Multi frames | Single frame |
| 3D | Multi frames | N/A | Single frame |

*NOTE: Verify the saved image works correctly on the Windows PC. If the image does not work, please save it again on the LOGIQ S7 Expert/Pro.*

## 'SaveAs' Images

You can select the images at one time which you want store by SaveAs in the Active Image screen.

Features are almost the same as the SaveAs feature. See 'Save As' on *page 15-11 for more information.*

*NOTE: We suggest that you save the images page by page with 'SaveAs' Images in Active Images. It takes time if you have many images or raw data.*

*NOTE: If the image has a filmstrip icon, this indicates a CINE Loop, which gets saved as a .wmv file; single images are saved as a jpeg file.*

*NOTE: 'SaveAs' Images function doesn't support images which are query/retrieved.*

1. In the Active Images screen, place the cursor on the image or CINE Loop to be saved and press **Set**. You can select multi images with multi pages.
2. Press ***'SaveAs' Images*** on the monitor display or the touch panel. The SaveAs menu appears.

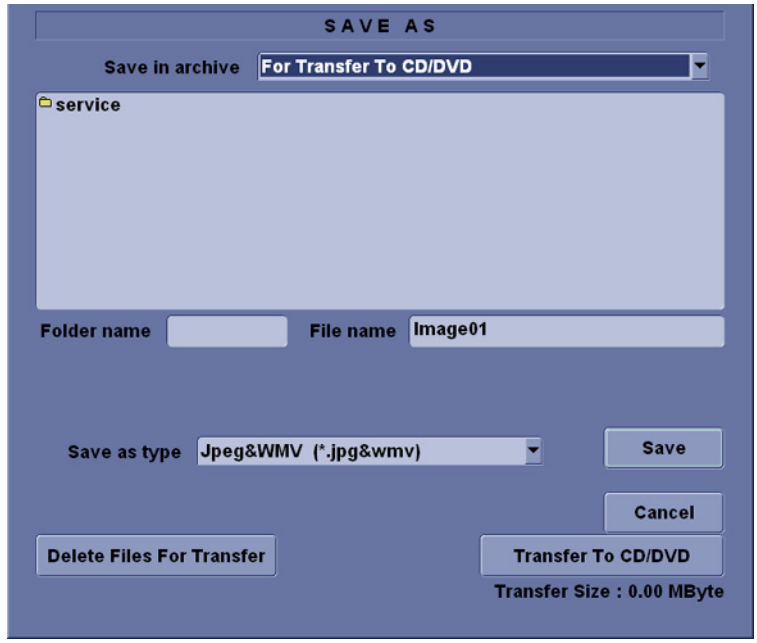



Figure 15-3. 'SaveAs' Images Menu

## 'SaveAs' Images (continued)

3. Ensure that Jpeg&WMV is selected, then press Save.

*NOTE: If you are saving to USB, images are transferred as soon as you press Save; if you are saving via Transfer to CD/DVD, you need to save images to the hard drive, then images are transferred when you select Transfer to CD/DVD. See below.*

## Notes on Transfer to CD/DVD

Transfer to CD/DVD transfers all saved files on the hard drive buffer to CD/DVD.

To Transfer saved files to CD/DVD,

1. After you have added all of the images/loops you want to save and are ready to write to the CD/DVD, transfer all the images at the same time. Press Save As--> Transfer To CD/DVD.

   A progress bar lets you know that the "Media transfer is in progress."

   If total transfer size is bigger than CD/DVD free space size, then only the files that can be copied to CD/DVD are transferred. After the copy is finished, the warning dialog displays. Warning dialog shows total required file size and transferred file size. Press ***OK*** and you need to change CD/DVD and press ***Transfer to CD/DVD*** again.
2. If you do not want to save the image to CD/DVD, select "***Delete Files for Transfer***" All images are deleted.
3. Press **F3** to eject.

*NOTE: Verify the saved image works correctly on the Windows PC. If the image/loop do not work, please repeat the Save operation again on the LOGIQ S7 Expert/Pro.*

### Storing Images with More Resolution

To store images with more resolution than is available with the JPEG selection, select Save As and select AVI as the Save As Type. You can save single images as .avi files.

Table 15-2: Store Options

| Image Type | Store as Image Only | Store as Secondary Capture |
|---|---|---|
| CINE Loop | Gives you a loop of just the image (no title bar and scan information). | Gives you a single image of the video area. DO NOT DO THIS BECAUSE YOU DO NOT KNOW WHICH IMAGE FROM THE LOOP THAT YOU ARE GETTING. |
| Still Image | Gives you a single image (no title bar and scan information). | Gives you a single image of the video area. |

# Data Transfer

The user can select and access the Exam Transfer services from the Exam Data Transfer screen.

- Import
- Export
- Worklist
- MPEGvue
- Q/R (Query/Retrieve)

*NOTE: Ensure that all patients are exported or backed up BEFORE deleting them.*

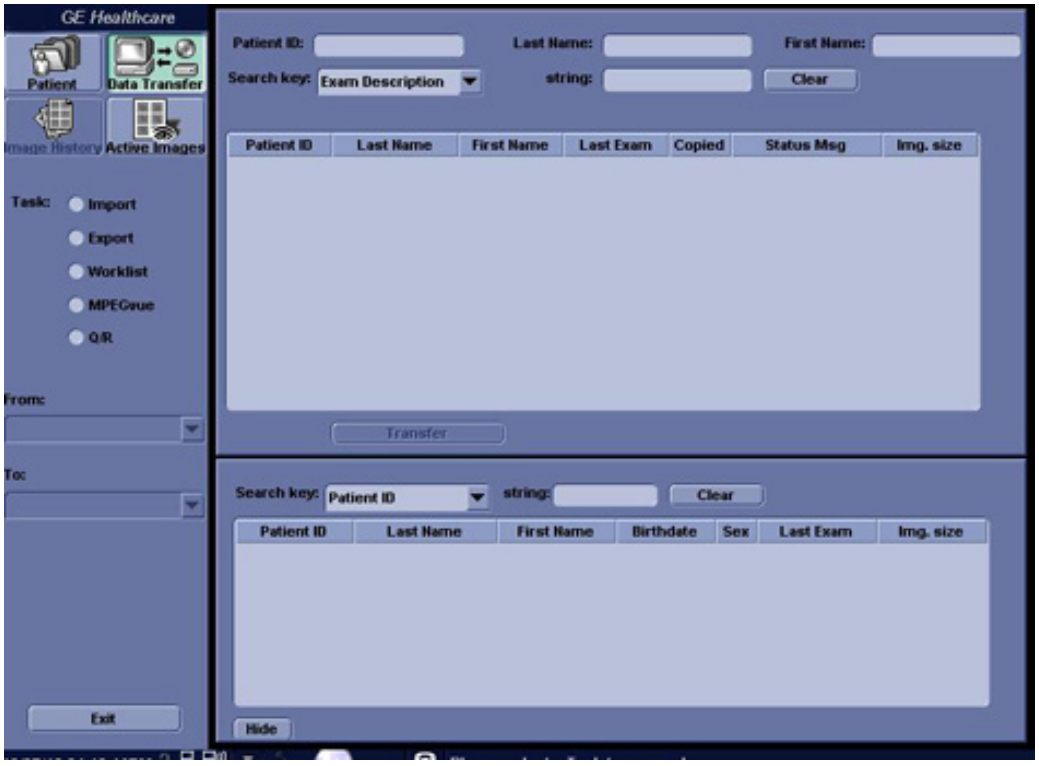



Figure 15-4. Exam Data Transfer Screen

## Export/Import

To move exams from one Ultrasound system to another system or to back up/retrieve exam information, you need to export/import exam information.

*NOTE: Both database information and images are exported. No data is deleted from the local archive when exporting data.*

*NOTE: Export/Import patient records may take more than ten (10) minutes. Please allow sufficient time to export/import patients.*

*NOTE: You MUST verify the media you use BEFORE performing Export/Import. You must do this once each session. If you encounter problems, eject the media and then re-insert the media; then try the Export/Import again.*

*NOTE: If you try exporting a previously backed-up exam, the message "Can't Find Source file" displays. The image data has already been removed from the hard disk drive with EZBackup/EZMove.*

*NOTE: Import/Export has only upward compatibility. For example, you can import data from a R1.x.x system to the current system. But you cannot import data from the current system to a R1.x.x system.*

*NOTE: It is STRONGLY recommended that you verify files on Eject when using Export.*

### Exporting Data

To export an exam(s) to a compatible Ultrasound system:

1. Format and label the removable media. Answer Yes/OK to the messages.

*NOTE: The system formats the unformatted CD-R/DVD-R automatically when you select Export on the data transfer screen.*

2. Press **Patient** and select ***Data Transfer***.
3. The Data Transfer screen is displayed. Select Export.
4. "Local Archive-Int.HD" displays on the Transfer From pull-down menu and the patient list included in the Local Archive displays.

## Exporting Data (continued)

5. Select the destination at the Transfer To pull-down menu.
6. Select the patient(s) to export by using the Transfer From search field (the upper field).

   You can use Windows commands to select more than one patient.

   To select a consecutive list of patients, click the cursor on the first name, move the cursor to the last name, then press and hold down the Shift+right Set key to select all the names.

   To select a non-consecutive list of patients, click the cursor at the first name, move the cursor to the next name, then press and hold down the Ctrl+right Set key, move the cursor to the next name, then press and hold down the Ctrl+right Set key again, etc.

   You can also search for patients via the Search key and string.

   Or, use Select All to select all patient.

*NOTE: You need to use your best judgment when moving patients' images. If there are lots of images or loops, then only move a few patients at a time.*

7. Press ***Transfer***. The progress bar displays during the transfer.
8. Press ***F3*** to eject the media. Specify that you want to finalize the media.

   After performing an Export, the system reflects that this operation was successfully completed; however, it is ALWAYS a good idea to verify that there was no corruption to the backup/export media during this process.

   To verify that the data was successfully transferred to the media, Press ***F3***, then select "Finalize" --> "Yes and Verify Files." If there was a corruption to the media during an operation, the message, "An error occurred on the last disk. Please discard it and start over." appears. In this case, please redo the operation with new media.

*NOTE: To display exported DICOM or Raw DICOM images on a PC, you need the dedicated viewer.*

## Importing Data

To import an exam(s) to another Ultrasound system:

1. At the other Ultrasound system, insert the media.
2. Press **Patient** and select ***Data Transfer***.
3. The Data Transfer screen displays. Press Import.
4. Select the media from the Transfer From pull-down menu.
5. The Transfer From search field shows the patients available for import from the removable media you just loaded onto the system.
6. Select the patient(s) or the exam(s) from the list to be imported.
7. Press Transfer. The progress bar displays during the transfer.
8. Please wait for the patient information to be copied to this Ultrasound system. Informational messages appear while the import is taking place.
9. Press ***F3*** to eject the media.

*NOTE: Use Import to restore EZBacked up and/or EZ Moved images.*

*NOTE: You can retrieve from the media to the Local HDD, playback, or process exam information on the system as Raw Data.*

## Query/Retrieve (Search and retrieve the data from DICOM device)

*NOTE: For Query/Retrieve to find a patient, the patient MUST have a Patient ID.*

*NOTE: Before you retrieve data from the Worklist server, make sure that default IP address is input in the Default Gateway field in Utility -> Connectivity -> TCP/IP.*

### Query

1. Press **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
2. Select Q/R. The patient/exam list in the Local Archive displays in the Transfer To section.

*NOTE: Only "Local Archive - Int.HD" is enabled for Transfer To.*

3. Select the Query/Retrieve server from the Transfer From pull-down menu.

*NOTE: The server is configured in the Utility screen. Multiple servers are able to be configured.*

4. Press Query in the Transfer From section. The Query is performed.
5. The server's patient list displays.

*NOTE: Press Query again to refresh the list.*

### Retrieve

1. Select the patient(s) or the exam(s) to be retrieved from the patient list.
2. Press Transfer. Retrieve the data from the Query/Retrieve Server. The progress bar displays during the transfer.

## Worklist (Search and retrieve the Patient/Exam information)

*NOTE: Before you retrieve data from the Worklist server, make sure that default IP address is input in the Default Gateway field in Utility -> Connectivity -> TCP/IP.*

*NOTE: You need to select the patient prior to sending images to a PACS.*

1. Press **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
2. Select Worklist. The patient/exam list in the Local Archive displays in the Transfer To section.

*NOTE: Only "Local Archive - Int.HD" is enabled for Transfer To.*

3. The Worklist used last time is displayed on the monitor display. Press Refresh to refresh the list or select another Worklist server from the Transfer From pull-down menu.

*NOTE: The worklist server is configured in the Utility screen. Multiple servers are able to be configured.*

*NOTE: You can configure whether the auto-refresh worklist has been enabled/disabled in the Utility screen. The system automatically refreshes the list when the exam data transfer accesses the Worklist server or changes the Worklist server.*

4. Select the patient(s) or the exam(s) from the list.
5. Press Transfer. The progress bar displays during the transfer.

## MPEGvue

You can see the exam data on the Windows PC by using MPEGvue.

CAUTION

DO NOT transfer more than 50 patients at one time.

CAUTION

DO NOT use lossy compression images, such as JPG or MPEG images, for diagnosis.

CAUTION

MPEGvue function is NOT compatible with other LOGIQ series products. Do NOT share the same USB Drive for MPEGvue between LOGIQ S7 Expert/Pro and other LOGIQ series products.

*NOTE: If you want label the removable media, format it before use. The system formats the unformatted CD-R/DVD-R automatically when you select MPEGvue on the data transfer screen.*

1. Insert the removable media.
2. Select **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
3. Select MPEGvue. The Patient list, which has images in the Local Archive, displays in the Transfer From section.

   Start the media formatting automatically except USB HDD. Label the media with “YYYYMMDD_#”.

*NOTE: Only “Local Archive - Int.HD” is enabled for the Transfer From.*

4. Select the media from the Transfer To pull-down menu.

*NOTE: Select Removable CD Archive if you use CD-R or DVD-R.*

## MPEGvue (continued)

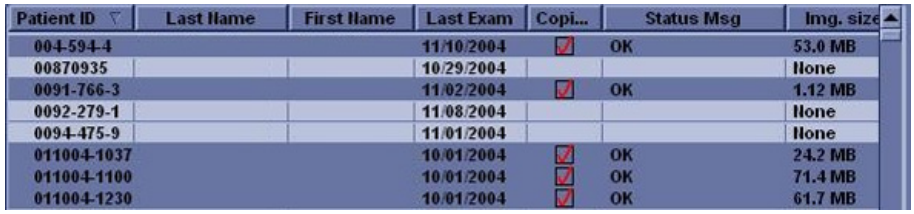
5. Select the patient(s) or the exam(s) from the list.

*NOTE: If you press Clear in the Transfer From and Transfer To section, all the search criteria clears and the list is refreshed accordingly.*

*NOTE: Trying to save 3D loops using MPEGvue, the 3D loops are saved as still images. Use "Save As" to save 3D loops.*

6. Press Transfer. The progress bar displays during the transfer.

   Displays the check mark in the Copi... field of the completed patient.



| Patient ID | Last Name | First Name | Last Exam | Copi... | Status Msg | Img. size |
|---|---|---|---|---|---|---|
| 004-594-4 | | | 11/10/2004 | ☑ | OK | 53.0 MB |
| 00870935 | | | 10/29/2004 | | | None |
| 0091-766-3 | | | 11/02/2004 | ☑ | OK | 1.12 MB |
| 0092-279-1 | | | 11/08/2004 | | | None |
| 0094-475-9 | | | 11/01/2004 | | | None |
| 011004-1037 | | | 10/01/2004 | ☑ | OK | 24.2 MB |
| 011004-1100 | | | 10/01/2004 | ☑ | OK | 71.4 MB |
| 011004-1230 | | | 10/01/2004 | ☑ | OK | 61.7 MB |

Figure 15-5. Completed patient

When the message "Not enough free space" displays during MPEGvue,

- CD-R/DVD-R: Please change to a new media.
- USB HDD/USB Flash Drive: Backup the current data in the USB device to the other media and clear the USB device.

## MPEGvue (continued)

If the following dialogue and message displays during MPEGvue, reduce the number of exams to gain space, and perform MPEGVue once again to a new media (CD-R/ DVD-R) or the USB device.

Figure 15-6. Error Dialogue

Figure 15-7. Error message in the Patient list

7. When the transfer is completed, press ***Exit*** to return to the scan screen and then eject the media.

*NOTE: The capacity of media (number of patients) and the writing time depends on the data size of each patient. If you try to save an image larger than 1GB using MPEGvue, it may take a few hours to save the image.*

*NOTE: Before you read the media on the PC, finalize the media on the LOGIQ S7 Expert/Pro.*

*NOTE: Measurement graphics from the exam performed on the system are maintained with the MPEG exam.*

CAUTION

DO NOT use “Verify” when ejecting the CD/DVD if you transferred multiple patients to the media using MPEGVue.

## MPEGvue (continued)

### On your PC with Windows 2000/XP

An MPEG exam can be read from any computer with Windows 2000/XP, provided that DirectX 8.1 or later and Windows Media Player 7.1 or later are installed.

*NOTE: Verify the saved image works correctly on the Windows PC. If the image does not work, please save it again on the LOGIQ S7 Expert/Pro.*

If a warning message displays, press ***OK*** to continue.

- Windows PC with Windows XP + SP2

  All media is readable.
- Windows PC with Windows XP + SP1

  All media is readable.

  But DVD-R/DVD-RAM with data greater than 4GB are not readable. An issue report from Microsoft states that SP2 fixes this problem. Please refer http://support.microsoft.com/kb/329112/EN-US/.

  LS8

  But DVD-R with data greater than 4GB are not readable. An issue report from Microsoft states that SP2 fixes this problem. Please refer http://support.microsoft.com/kb/329112/EN-US/.
- Windows PC with Windows 2000 + SP4

  Only CD-Rs are readable. DO NOT perform MPEGvue using a DVD-R/-RAM.

  LS8

  Only CD-Rs are readable. DO NOT perform MPEGvue using a DVD-R.

**On your PC with Windows 2000/XP (continued)**

- "Active-X" security block on Windows XP + SP2

  When attempting to view an MPEGVue exam on a PC which is running on WindowsXP with Service-Pack 2, the image remains blank if you click on a thumbnail.

  If this occurs, do the following steps:

  - When running MPEGVue and you click on one of the clipboard thumbnail images, the following message appears:

    "To help protect your security, Internet Explorer has restricted this file from showing active content that could access your computer. Click here for options"
  - Place the mouse over the message "To help protect your security..." and click over it.
  - Select "Allow Blocked Content..." in pop-up menu.
  - A security warning message appears. Select "YES".

    The Exam should start to display normally at this point.

*NOTE:* *Every time you attempt to view another exam you will need to repeat the procedure described above.*

### On your PC with Windows Vista

When you try reviewing MPEGvue on a Windows Vista-based computer, the dialog, “An important update for MPEGVue Player Software Component (vX.X.XX) is available for this computer...” displays. Press **No** on the dialog and eject the medium.

Then do the following steps to install the MPEGVue Player Software Component with administrative rights.

1. Click **Start**, and then click **Control Panel**.
2. In the Control Panel, click **User Accounts And Family Safety**.
3. Click **User Accounts**.
4. Click **Turn User Account Control On of Off**.
5. The message, “Windows needs your permission to continue” displays. Press “Continue.”
6. Uncheck the checkbox for **User Account Control ((UAC) To Help Project Your Computer**, and then click **OK**.
7. When prompted, restart your computer.
8. Insert the medium with MPEGVue data. The dialog “An important update for MPEGVue Player Software Component (vX.X.XX) is available for this computer...” displays. Press **Yes**.
9. The MPEGVue Player Software Component will be installed. When the install is done, check the checkbox for **User Account Control (UAC) To Help Protect Your Computer** according to the steps 1 - 6 above.
10. You can now review MPEGVue on your computer.

## MPEGvue (continued)

### On your PC with Windows 7

When you try reviewing MPEGvue on a Windows 7-based computer, the dialog, “An important update for MPEGVue Player Software Component (vX.X.XX) is available for this computer...” displays. Press **No** on the dialog and eject the medium.

Then do the following steps to install the MPEGVue Player Software Component with administrative rights.

1. Click **Start**, and then click **Control Panel**.
2. In the Control Panel, click **User Accounts And Family Safety**.
3. Click **User Accounts**.
4. Click **Turn User Account Control On of Off**.
5. Note the original notify level and change notify level to “Never Notify”.
6. The message about confirmation, press **Yes**.
7. Press **OK**.
8. Restart your computer.
9. Insert the medium with MPEGVue data. The dialog “An important update for MPEGVue Player Software Component (vX.X.XX) is available for this computer...” displays. Press **Yes**.
10. The MPEGVue Player Software Component will be installed. When the install is done, change notify level according to the step 1 - 5 of the above.
11. You can now review MPEGVue on your computer.

## MPEGvue (continued)

CAUTION

DO NOT modify the folder name and the folder configuration of MPEGvue which is created in the media.

*NOTE: Select "MPEG4 Windows Media Format (*.wmv)" when you save the Cine image from CD/DVD to the HDD while reviewing it on your PC.*

*NOTE: Measurement graphics from the exam performed on the system are maintained with the MPEG exam.*

1. To read MPEG exams stored on a CD-R/DVD-R:
   - Insert the MPEGVue CD-R/DVD-R in the computer CD drive. The MPEGVue Patient list is displayed.

   To read MPEGVue exams stored on other media:
   - Insert the media containing the MPEG exams and double-click on the file Start_MPEGvue.bat. The MPEGVue Patient list is displayed.

Figure 15-8. Patient list

2. Select the desired examination date to display the images. The MPEGVue screen is displayed.

## MPEGvue (continued)

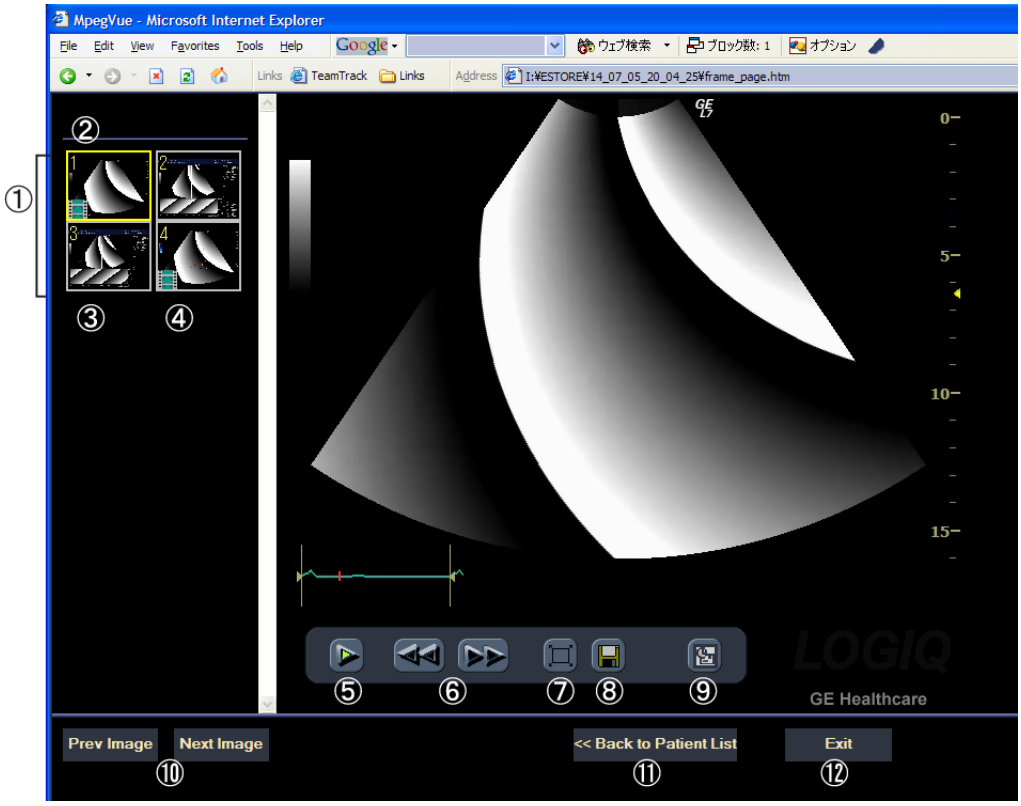



Figure 15-9. MPEGvue screen

1. Clipboard: select the image to display
2. Selected image
3. Single frame image
4. Cineloop
5. Freeze/run cineloop
6. Scrolling tool when in Freeze
7. Display full screen
8. Save image as .wmv, .bmp, jpeg, jpeg, or .avi
9. E-mail support
10. Display previous/next image
11. Display the MPEGVue patient list
12. Exit

## MPEGvue (continued)

### E-mail support

Sending images or examinations by e-mail.

*NOTE: E-mail support and a desktop icon cannot be used on a non-English PC.*

The selected image or the entire examination can be sent by e-mail as an attachment, providing the computer has a mail client application (e.g. MS Outlook, MS Outlook Express).

*To send an image*

1. Select the image to send on the clipboard and select the e-mail button. The e-mail dialogue window displays.
2. Check Send current image. The e-mail address window displays.
3. Select an existing address or enter a new address. Up to 10 addresses can be stored.
4. Select Send.
5. The e-mail with the image is sent and a Confirmation window displays. Select OK.

The person receiving the e-mail can open the image in Windows Media Player.

## E-mail support (continued)

*To send an examination*

Examinations sent by e-mail as attachments are zip-compressed, encrypted and password protected. If the size of the exam is too large to be sent as a single attachment, it is divided into several zip file attachments and sent in several e-mails.

1. Open the examination to send in MPEG viewer and select the e-mail button. The e-mail dialogue window displays.
2. Check Send current exam. The e-mail address window displays.
3. Select an existing address or enter a new address.
4. Select Send. The Password window displays.
5. Enter a password and select OK. The exam is sent and a confirmation window displays. Select OK.

*To open an MPEGvue exam from an e-mail*

1. In the MPEG viewer press the E-mail button. The E-mail dialogue window is displayed.
2. Check Receive exam. The Password window is displayed.
3. Enter the password and select OK. The exam is uncompressed and opened in the viewer and the E-mail(s) containing the MPEG examination is deleted.

## Send To (Send the image to the DICOM Device)

"Send To" sends the selected exam for a patient and to interactively Send-To the exam to a destination DICOM device configured on the system. An exam in this case includes its images and any corresponding Structured Report.

1. Search and select the patient and press ***Review***. The Patient Exam screen displays.
2. Select the exam which has the images and press ***Send to***.

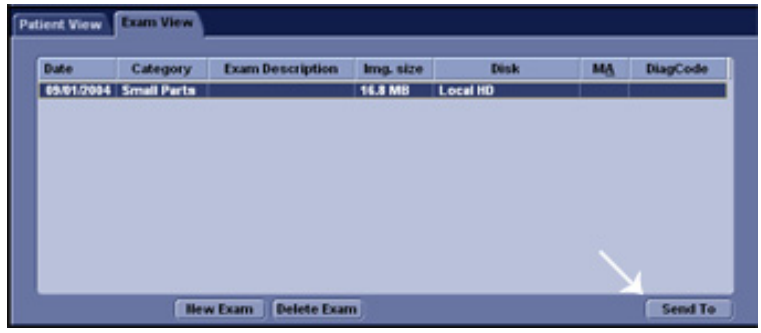



Figure 15-10. Send To

*NOTE: You can only select "Local Archive - Int.HD" for Workflow.*

The Send To Dialogue box displays.

3. Select the destination device and press ***OK***.

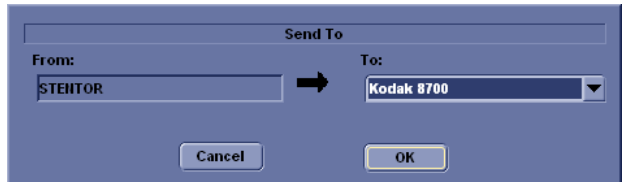



Figure 15-11. Send To Dialogue Box

*NOTE: The destination device is configured in the Utility screen. Multiple devices are able to be configured.*

The successful/unsuccessful message is displayed at the bottom of the screen.

## Selectable Send To

"Selectable Send To" sends the selected images for an exam and allow you to interactively Send-To the exam from Local Archive or DICOM Read to a destination DICOM device configured on the system.

1. Select a patient or an exam in the Patient menu.
2. Go to Active Images.
3. Select an image (images) and press ***Send To***. Send To Dialogue displays

*NOTE: If the image is not selected, warning dialog is displayed and no image is sent.*

4. Select a destination from the pull-down menu and press ***OK***.

   "Selected image(s) is (are) send to" message displays on the status bar.

*NOTE: Active Images menu and the touch panel shall not have "Send To" button if the patient is not selected.*

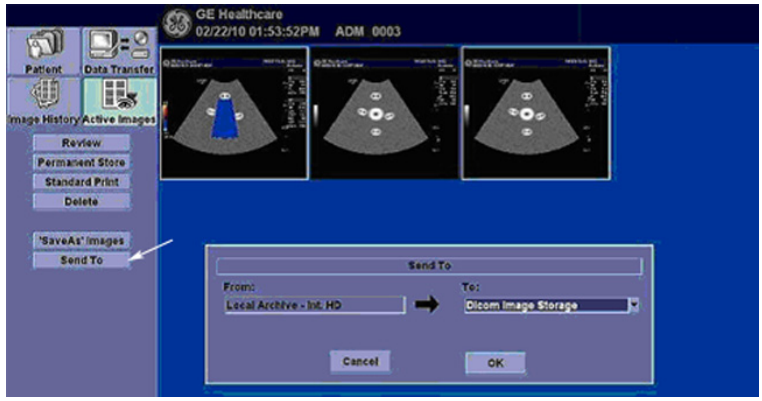



Figure 15-12. Selectable Send To Dialogue Box

## Using the DICOM Spooler

To monitor/control DICOM jobs, press F4. You can view, resend, redirect, and delete images from the DICOM spooler by selecting a job, then specifying the action to be performed on this job.

*NOTE: If you find a failed job(s) in the Spooler, please remove the failed job(s) from the Spooler.*

Table 15-3: Spooler status description

| Status | Description |
|---|---|
| Hold | Waiting for user activity. Select Resend or Send-To to complete the job. |
| Pending | Waiting for the previous job(s) to finish (a previous job may be Active or Pending).<br>No user interaction required. |
| Append | Not completed.<br>Example 1: Direct Storing job. Waiting for more images or the end of the exam (by selecting New Patient or End Current Patient).<br>Example 2: Print job with 3x3 images has only 8 images. Waiting for one more image or the end of the exam (by selecting New Patient or End Current Patient). |
| Active | Signifies network activity (or connection attempt). |
| Success | Sent successfully. |
| Failed | Unsuccessful job attempt. Job stays in spooler. Select Retry or Delete to complete the job. |
| Done | Finished successfully. |

# External drives

## Removable media

Removable media can be used for the following purposes:

- Long-term image storage: the final destination of the images, after they are moved out of the system hard disk by using the EZBackup/EZMove (see ).
- Backup of patient database and system configuration presets (see )
- Export to copy a set of patient records to a third party DICOM review station.
- MPEGVue: review exported images on a Windows computer (see ‘MPEGvue’ on *page 15-25*).
- Copy of system configuration presets between to units using the Backup/Restore feature (see ).
- SaveAs: Save images as JPEG, WMV, AVI, DICOM and RawDICOM for review on a standard Windows computer.

### About removable media and long-term image storage

If CD/DVD is used it is recommended to use Archive Grade or Medical Grade CD/DVD.

No matter which media is used, it is always highly recommended to make a backup of the media, which is the responsibility of the customer.

HINTS

Keeping your media disc in an original media case or caddy all the time will prevent it from becoming dirty or damaged.

## DVD Drive

The DVD drive (Standard) is located at the top of the cabinet.

You can use these to perform software upgrades, image archiving and service diagnostics.

You can use the following media for the multi-drive:

- CD-R (maximum writing speed: 48x)
- DVD-R (maximum writing speed: 16x)

**DO NOT** use or attempt to format CD-RW, DVD+R, DVD+RW or DVD-RW on the LOGIQ S7 Expert/Pro DVD Multi-Drive.

Due to the variety of disk types, we cannot guarantee that every media is available.

### Recommendation concerning CD and DVD handling

To avoid data loss, never touch the recordable surface of a disk. Handle the disk only by the outer edge. Do not place it face down on a hard surface. Fingerprints or scratches will make the disk unusable. Before usage, verify that the disk surface has no visible scratches. If there are any scratches, do NOT use the disk.

### Insert a media

Insert a media with the eject button on the DVD drive.

When you put a media into the DVD drive, please make sure the media is placed in the right position. If the media is not placed in the right position, the media may be damaged.

Make sure that the Disk tray is securely placed in each device during system operation. Mechanical damage may occur if other objects hit the tray.

### Eject a media

1. To eject a media, always press ***F3***. **DO NOT** use the eject button on the drive.
2. The Eject device menu is displayed. Select ***CD/DVD Recordable***.
3. When ejecting a media, you are prompted if you wish to finalize the disk. If you do not finalize the disk, you can add files to the media at a later time. However, you may not be able to view the files stored on this disk with a standard PC. Finalizing a media, allows you to view these files using most standard PCs.

   To verify that the data was successfully transferred to the media, Press ***F3***, then select “Finalize” --> “Yes and Verify Files.” If there was a corruption to the media during an operation, the message, “An error occurred on the last disk. Please discard it and start over.” appears. In this case, please redo the operation with new media.

*NOTE:* *When you press **F3** with a blank media inside the DVD drive, the finalization menu displays. You can select “Yes” or “Yes and Verify Files”, but the system ejects the media without doing anything.*

## USB Hard Disk Drive and USB Flash Drive

### Cautions and Warnings

DO NOT use the USB Hard Disk Drive for patient storage. The USB HDD is not considered a permanent storage device.

If you connect the USB HDD to a virus-infected computer, the USB HDD may also be infected with a computer virus.

DO NOT plug in TWO Bus-powered USB Drives at the same time.

When exporting a large quantity of patient data to the USB-HDD, the system may crash. If this occurs, the export is not completed properly. First, delete the data remaining in the USB-HDD, and then try again with a smaller number of patients.

Disconnect the USB HDD when performing EZMove on the system.

DO NOT use “Select All” when you export the patient data to the USB-HDD.

### Cautions and Warnings (continued)

*NOTE: Do not insert USB Memory devices (hard drives or flash drives) that contain multiple partitions into the scanner. Use single partitioned USB Drives.*

*NOTE: Some USB memory device manufacturers allow for executable partitions or ship pre-formatted new USB memory devices with multiple partitions pre-configured. BEFORE inserting any memory device into the scanner, insert it into a PC or MAC to verify that there is only a single partition. If multiple partitions exist, contact the USB manufacturer for the steps in reformatting the memory to a single partition.*

### USB Ports

You can use the USB port on the control panel for USB flash drives.

Figure 15-13. USB port on the control panel

### Formatting the USB Flash Drive

*NOTE: Before using the USB flash drive, format it in Utility -> Connectivity -> Removable media.*

To format the USB Flash Drive

1. Insert the USB Flash Drive into the front USB port.
2. Select Utility--> Connectivity--> Removable Media.
3. Select USB Drive from the Removable Media pull-down menu.
4. Type the USB Flash Drive label.
5. Press ***Format***.

### Eject a USB Flash Drive/USB HDD

1. To eject a removable media, always press ***F3***. **DO NOT** use the eject button on the drive.
2. The Eject device menu is displayed. Select the relevant media.
3. Select USB Drive from the pull-down menu to disconnect the USB Drive. Disconnect the USB drive after the success dialogue is displayed.

   Remove the USB Drive from the USB port.

*NOTE:* *If the unsuccessful dialogue is displayed, retry after a while.*

*NOTE:* *Verify is NOT available on Flash Drives or Hard Disk Drive media.*

### MPEGvue (Data Transfer)

To transfer a patient/exam to the USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. On the Patient menu, select ***Data Transfer***, then ***MPEGvue***. Specify USB Drive in the transfer To: pull-down menu. Select the patient/exam you want to transfer. Press ***Transfer***.
3. When the transfer has been completed, press ***Eject (F3)***.

After transferring images to a USB Drive using MPEGVue, verify that the images have actually transferred to the USB drive.

### Backup/Restore

To Backup/Restore to/from a USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. Press Utility--> Backup/Restore. Select the USB Drive as the media.
3. Follow instructions for Backup/Restore. See ‘Backup and Restore’ on *page 16-33 for more information.*
4. When the Backup has been completed, press ***Eject (F3)***.

**SaveAs**

*NOTE: See 'Save As' on page 15-11 for more information.*

To save images to the USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. Select the image(s) to be saved.
3. Select ***Save As*** menu in the lower, right-hand corner of the screen. Select the USB Drive as the archive media.
4. Specify: Image only or Secondary Capture, type of compression, quality, and image save format (Raw DICOM, DICOM, Avi, Jpeg, or WMV).
5. Press ***Save***. When the images have been saved, press ***Eject (F3)***.

*NOTE: If you perform the SaveAs function to the USB drive (:\Export) by RawDICOM format and review the data on your PC, the title of the data appears as ":\GEMS_IMG\2006_Oct\08(date)\xxxxx(PatientID)".*

**Direct SaveAs**

You can save the image directly to the USB Drive just by pressing a **Print** key.

*NOTE: "Direct SaveAs" doesn't supports WMV type.*

1. Insert the USB Drive into the USB port.
2. Select ***Save As*** from the pull-down menu in Utility -> Connectivity -> Service. Press ***Add***.
3. Select ***Save As*** in the list. Rename it in the Name field if needed.
4. Select USB Drive in the Destination field.
5. Verify the service.
6. Press ***Save***.
7. Assign Save As to the appropriate print key in Button tab.
8. Display the image on the monitor and press the print key.

**Export/Import**

To export/import exams using the USB Flash Drive or USB HDD,

*NOTE: Before you export exams to the USB HDD, check "Export to USB HDD: Create DICOMDIR" in Utility -> Connectivity -> Miscellaneous. If you uncheck this parameter, you must import the data to review.*

1. Insert the USB Drive into the front USB port.
2. On the Patient menu, select Data Transfer, then Export/ Import. Specify USB Drive in the transfer To: pull-down menu. Select the patient/exam you want to transfer. Press ***Transfer***.
3. When Export/Import has completed, press ***F3***.

**EZBackup (USB HDD only)**

1. Select "USB Drive" on the Utility -> Backup/Restore -> EZBackup/Move -> Media.
2. Follow instructions for EZBackup. See 'EZBackup and EZMove' on *page 16-37 for more information.*
3. When EZBackup has completed, press ***F3***.

*NOTE: "Media capacity for estimate (MB)" in Utility -> System -> Backup/Restore -> EZBackup and EZMove are not effective when the Media is "USB HDD". It only applies to the CD and DVD.*

## USB Quick Save

USB Quick Save easily sends images to a USB memory stick or Network Storage.

The images are stored either in .jpg or .avi format.

*NOTE: The P3 button is set to USB Quick Save (USB memory stick option) by default.*

### USB Quick Save Setup

Select USB Quick Save Type

In Utility -> Connectivity -> Service, select USB Quick Save. With this selected, the Properties' Destination drop down selections are either USB Key or Network Storage. USB Key is to store images on the USB memory stick whereas Network Storage is to store images on the network storage.

*NOTE: For using the USB Quick Save service as Network Storage, the Network Storage service must already be configured.*

See ‘Network Storage Service’ on page 1-72 for more information.

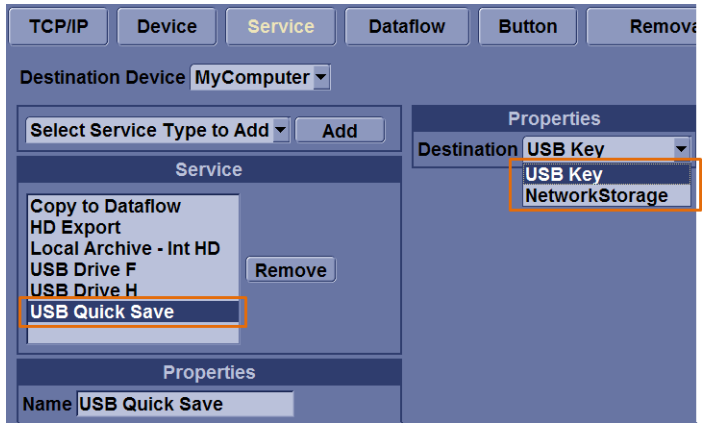



Figure 15-14. Service USB Quick Save

**USB Quick Save Setup (continued)**

USB Quick Save via P3 Key

Pressing the P3 key stores images to the USB Quick Save.

Figure 15-15. USB Quick Save via P3 Key

Assigning USB Quick Save to Print Keys

The USB Quick Save service can also be assigned to other Print keys via the Utility -> Connectivity -> Button preset menu as described in Chapter 16.

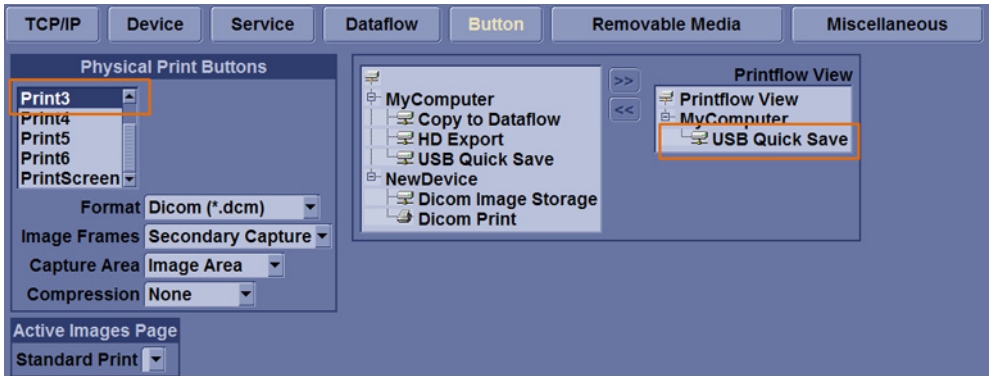



Figure 15-16. Assigning USB Quick Save to Print Keys

## Network Storage Service

You can save patient data/images to the PC directly with the following functions, if you select Network Storage service.

- Save As
- Export/Import
- MPEGvue
- DICOM Read

*NOTE: DO NOT share the folder used for Export/Import with other ultrasound systems. It causes loss of data if two or more systems access to the same folder. Please create the unique folder for each system.*

*NOTE: Before you export patient data/images using Network Storage, check "Export to Network Storage: Create DICOMDIR" in Utility -> Connectivity -> Miscellaneous. If you uncheck this parameter, you must import the data to review.*

CAUTION

After MPEGVue to Network Storage, the MPEGVue patient may not be listed in the To list. Make sure to confirm on the destination to storage whether the copy of data succeeded.

### Potential risk

- Patient/Image data might not be sent at all with inaccurate network configuration.
- Patient/Image data might be lost by disconnecting the network.
- Patient/Image data might be damaged by unstable network/ data coupling.
- Patient/Image data might be mixed up by network/data coupling.
- Patient/Image data might be sent to wrong destination if network configuration is not inaccurate.
- The system might be attacked by a virus and vulnerable infection.
- Network is not connected by IP address conflict.

**LOGIQ S7 Expert/Pro Setup**

*NOTE: Create a Share folder on your PC on the network before continuing with this setup.*

1. Select ***Utility -> Connectivity -> Device***.
2. Select ***Add***.
3. Type the computer name in the Name field and Static IP address in the IP Address field.

*NOTE: Only use alphanumeric characters for the name.*

*NOTE: If you change Static IP Address after export, you cannot import patient data/image. In this case, type previous IP address again before import.*

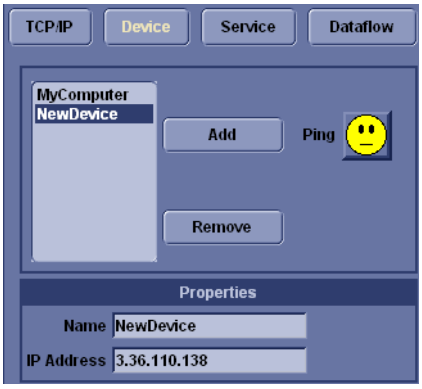



Figure 15-17. Network Storage Service setup - Device

**Network Storage Service (continued)**

4. Select ***Ping*** to verify the icon changes (smiley face appears).
5. Select Service.

   Select the ***Network Service*** from the pull-down menu. Select ***Add***.

   Specify the properties for this service.

   - Name: Enter unique name that identifies this service.

   *NOTE: Do not use the same name for any other Service or device.*

   - Password: Enter the password used for logging onto the PC.
   - User name: Enter the user name used for logging onto the PC.
   - Shared Dir: Enter the Share name of the folder.

   *NOTE: Only use alphameric characters for the Shared Dir.*

6. Select ***Save*** and select ***Verify*** to verify the icon changes (smiley face appears).

   It takes a long time to access Network Storage Service by the condition of the network.

**Setup on your PC**

Check with your network administrator about the LAN connection and setting method of the shared folder.

# Printing Options

## Setting up Digital Peripherals

You set up digital peripherals from the Utility --> System --> Peripherals menu.

Following printers can be connected to the power outlet supplied by the system.

- BW Printer: UP-D897, P95D
- Color Printer: UP-D25MD

About UP-D55, you have to insert the USB cable into the USB port of the rear panel and plug into a wall socket.

*NOTE: Printing using a standard printing service overrides the orientation and N-up feature of the printer preferences. Printer preferences are set up in the printer folder (via Utility --> System --> Peripherals. Select Properties under Standard Printer Properties).*

## Digital Printer Setup

There are two steps to do when setting up a digital printer: 1) follow the procedure below for each printer, then 2) set up specific properties for each printer.

Follow this procedure for each printer:

1. Select Utility--> Connectivity--> Service. Add the Standard Print service. Select the printer from the Printer pull-down Properties menu. For the UP-D897 printer, select “Portrait” as orientation.
2. Type the printer name in the Name field. This name is used on the Button screen. After you select the printer from the Printer pull-down Properties menu again, it turns white. Press Save.
3. Select Button. Select the appropriate print key (Print1, Print2...) from the Physical Print Buttons section. Select the printer from the MyComputer column and press >> to move it to the Printflow View column. Press Save.

### Sony UP-D25MD Instructions

Follow these steps to set up the paper size of Sony UP-D25MD printer.

1. Press Utility-->System-->Peripherals. Select the UP-D25MD from the pull-down menu under Standard Printer Properties. Click ***Properties***.

Figure 15-18. Properties

2. Select Properties from Printer pull-down menu.

Figure 15-19. Properties

3. Click Printing Preferences at the bottom of Properties Window.

Figure 15-20. Printing Preferences

4. Select Paper Size. Press ***Apply***. Press ***OK***.
5. Press ***Save***, then ***Exit***.

**Notes for Sony UP-D55**

- Before powering on the LOGIQ S7 Expert/Pro, connect the UP-D55 and turn the printer power on.

  There is no warning to let you know that the printer is not functioning. Check the printer.
- DO NOT remove the cable while the LOGIQ S7 Expert/Pro is powered on.
- DO NOT plug in a UP-D55 while the LOGIQ S7 Expert/Pro is turned on.

## Setting up the Off-Line Paper Printer

You can connect an off-line paper printer via the USB connection.

Following printers can be supported.

- HP Officejet H470

CAUTION

ONLY plug in devices to the USB ports located at the rear of the system WHILE the LOGIQ S7 Expert/Pro is NOT powered up. If you plug in a device while the LOGIQ S7 Expert/Pro is powered on, your system may become unusable.

CAUTION

DO NOT place an off-line paper printer inside the patient environment. This assures compliance to leakage current.

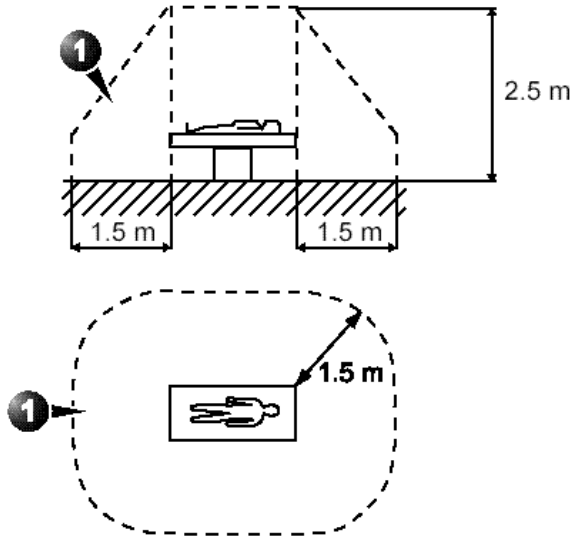



Figure 15-21. Patient Environment

**Setting up the off-line paper printer**

*NOTE: The printer driver is customized for the LOGIQ S7 Expert/Pro at the factory; you do not need to change the settings.*

1. Connect the printer to the USB port.
2. Select ***Utility***--> ***Connectivity***--> ***Service***. **Add** the *Standard Print* service.

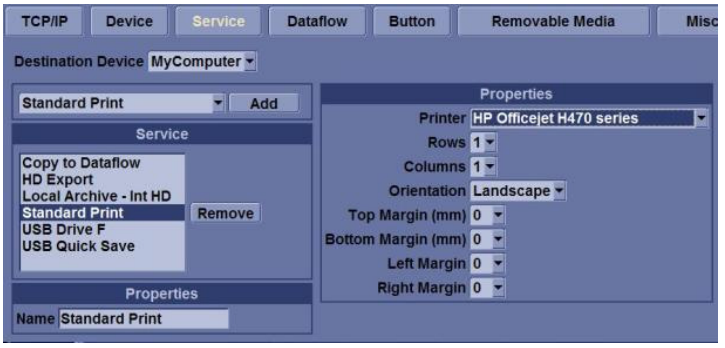



Figure 15-22. Connectivity -> Service Screen

3. Select the printer from the Printer pull-down Properties menu.

*NOTE: After selecting the printer, the field turns white.*

4. Set the following parameters in Properties:
   - *Rows*=3
   - *Columns*=2
   - *Orientation*=Portrait
   - *Right Margin (mm)*=10
5. Type the printer name in the *Name* field.

*NOTE: This name is used on the Button screen.*

**Setting up the off-line paper printer (continued)**

6. Press *Save*, then select the Button tab.
7. Select the appropriate print key (Print1, Print2...) from the Physical Print Buttons section.
8. Select the printer from the MyComputer column and press ">>" to move it to the Printflow View column.

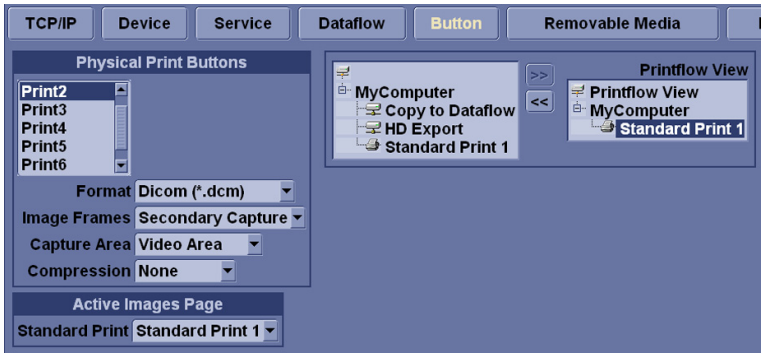



Figure 15-23. Connectivity -> Button Screen

9. If you want to assign this printer to the Standard Print Button on the Active Image Screen, select this printer at the Active Image Printer section.
10. Press Save.

NOTE: *If you want settings other than 1 image per sheet, or 2x3 sheet, or to improve the image quality, refer to the manual that came with the printer.*

### Setting up the Printer to Print Reports

To set up the Off-Line Printer to print reports,

1. Press ***Utility***--> ***System***--> ***Peripherals***.
2. Select the printer from Default Printer pull-down menu.

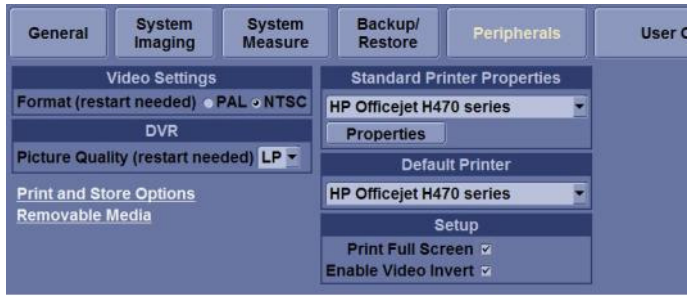



Figure 15-24. Report Printer Setup

3. Press ***Save***.
4. Press Print on the Report screen to print the report.

# DVR (Option)

## Setting up the DVR

To set up the Digital Video Recorder (DVR),

1. Assigned [Video] to one of the User Configurable Key in Utility -> System -> User Configurable Keys.

   or

   Check “Show Video Tab” in Utility -> Application -> Settings to display a Video tab on the touch panel.
2. Select the ***Utility --> System --> Peripherals*** on the touch panel. Then go to the DVR section.
3. Specify Picture Quality (LP/EP).
4. Restart the scanner.

The DVR functions records scan screen.

## Using the DVR

1. Create a patient record or open an existing one.
2. Press ***Video*** assigned key or Video tab.
3. Insert a DVD+RW in the DVR drive.

*NOTE: Please wait a moment after inserting media prior to pushing any button in the Video tab.*

4. Press ***Record Stand-By*** to toggle between RecPause in recording mode and Stop in playback mode.

*NOTE: **"Record Stand-By"** button switches between playback mode and recording mode, that takes about 30 seconds.*

*NOTE: You can create up to 8 titles in a disc and 30 chapters in a title.When you pause recording, a chapter is created.When you stop recording, a title is created. When you end examination of current patient (e.g. pressing New Patient, End Current Patient, ...), it auto stops recording and creates a chapter.*

As you use Record/Stop, the system lets you know that the data is being recorded. During this time, you cannot perform any other video function. While the title data is being written, you cannot scan, during which time the Busy state icon (flashing green exclamation point) is displayed.

5. Press ***Format*** on the touch panel to delete data.

*NOTE: The scanner performs auto format when a new disk is inserted. Format button in DVR tab is not for new disc but for deleting all the data recorded on the disc.*

6. Press ***Eject*** on the touch panel to eject a DVD+RW.
7. To return to scanning, select **Scan** tab on the touch panel.

### Support media

DVR supports DVD+RW disc only.

### Support format

- NTSC (W:720 x H:480)
- PAL (W:720 x H:576)

## Using the DVR (continued)

### Support picture quality

- LP

  Record length: approx. 100 minutes.
- EP

  Record length: approx. 170 minutes.

*NOTE: Up to 8 video titles are allowed to be recorded.*

### Compatibility

Format of DVD+RW recorded on LOGIQ S7 Expert/Pro has a compatibility with following players:

- LOGIQ S7 Expert/Pro DVR
- Software DVD video player.
- Commercial DVD video player.

### Stop-watch icon

Sometimes, the stop-watch icon appears on the touch panel key. If you press the touch panel key with stop-watch icon, the message appears on the clipboard area.

During the message displays, the operator can only scan.

Figure 15-25. Stop-watch icon and message

## Video touch panel Menu

The DVR is operated from the ultrasound unit touch panel. The DVR status displayed on the screen indicates the current DVR function.

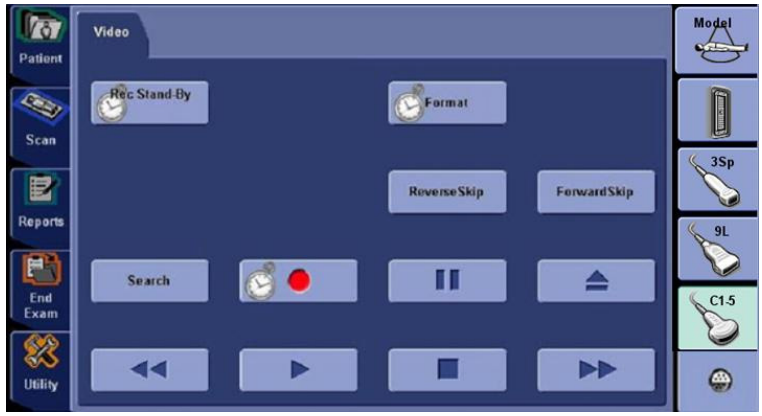



Figure 15-26. Video tab

Table 15-4: touch panel Keys

| touch panel Key | Explanation |
|---|---|
| Record Stand-by | Change the DVR state to RecPause in recording mode or Stop in playback mode. |
| Format | Deletes all the record in the DVD+RW. |
| Reverse Skip | Skip to the previous chapter. |
| Forward Skip | Skip to the next chapter. |
| Recording Icon (Red circle) | Start recording. |
| Pause Icon ( II ) | When in Playback mode, switches between playback and pause.When in Recording mode, switches between recording and pause.<br>NOTE: Freeze key works the same as Pause button, when in Playback mode. |
| Eject Icon | Ejects DVD tray. |
| Fast Rewind Icon ( << ) | Fast Rewind (speed -2x). |
| Playback Icon ( > ) | Playback. |

Table 15-4: touch panel Keys (Continued)

| touch panel Key | Explanation |
|---|---|
| Stop Icon ( Box ) | Stops playback or recording. |
| Fast Forward Icon ( >> ) | Fast Forward (speed -2x). |
| Search Recording Title | Press Search to start Search dialog. Select Title, adjust offset then press Search Counter to start the Search. |

*NOTE: The following controls in video tab are disabled while Record Standby is active: [Reverse Skip], [Forward Skip], [Search],[Eject], [Fast Rewind], [Fast Forward], [Play].*

## DVR Display Icons

The following icons display when the DVR is active:

Figure 15-27. DVR Icons

Table 15-5: DVR icons

| 1. DVR status | | 2. Disc status | |
|---|---|---|---|
| | Recording | | CD-R (DVR supports DVD+RW disc only) |
| | Stop Recording | | DVD-R (DVR supports DVD+RW disc only) |
| | Pause Recording | | DVD+RW |
| | Playback | Green bar | Free space |
| | Stop Playback | 3. Current Title Number displays while recording. | |
| | Pause Playback | 4. Time counter. | |
| | Fast Rewind | | |
| | Fast Forward | | |

# *Chapter 16*

# Customizing Your System

*Describes how to create system, user, and exam presets.*

# Presets

## Overview

Preset Menus provides the following functionality:

- **System presets**. View and update general system configuration settings, measurement and analysis settings, and video settings; backup and restore data and configuration files.
- **Imaging presets**. View and update exam and imaging parameters.
- **Comment library presets**. Set up comment libraries by application.
- **Body Pattern library presets**. Set up body pattern libraries by application.
- **Application and User Defined presets**. Configure application- and user-specific settings.
- **Test patterns**. Helps configure system settings.
- **Connectivity Setup**. Define connection and communication setup, including exam dataflow information.
- **Measurement and Analysis presets**. Customize exam studies, create measurements, set up manual sequencing, and create OB Tables.
- **Reports Presets**. Allows you to edit the report template, diagnosis codes, and report comments. Please refer to Chapter 14 for more information.

## Overview (continued)

- **Administration presets**. Perform system administrator activities such as setting up user IDs and logon formats.
- **Service**. Activates the Service Browser.
- **Scan Assistant**. Create, import/export, and manage Scan Assistant programs.
- **Search**. You can search for a parameter on the Utility pages (Measure, Reports, and Service pages cannot be searched.)

To access these functions, select the ***Utility*** tab on the touch panel, then select the appropriate touch panel key.

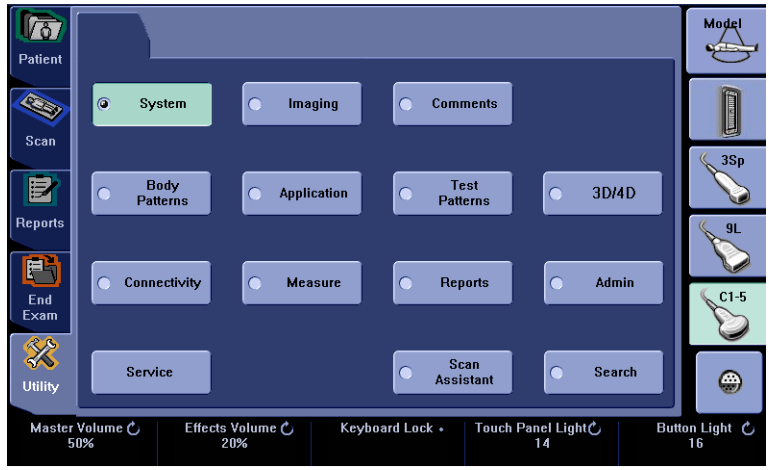



Figure 16-1. Utility touch panel

In addition, you can adjust the following via the rotaries located beneath the touch panel.

- **Master Volume**. Select to adjust the system volume, e.g., Doppler volume.
- **Effects Volume**. Select to adjust the system notifications, e.g., touch panel pushes, Print sounds, etc.
- **Keyboard Lock**. Select to lock the Operator Panel controls in order to clean the system.
- **Touch Panel Light/Button Light**. Select to adjust the backlighting on the Operator Panel and the touch panel.

# System Presets

## Overview

System presets allows you to view or change the following parameters

- **General** – Location, Date/Time, Patient Info, Key Usage, and Utility configuration
- **System Imaging** – Cardiac, Biopsy Guides, and Image Control and Display configuration
- **System Measure** – Measurement, Cursor, and Results Window configuration
- **Backup/Restore** – Backup, Media, EZBackup/EZMove, Detailed Restore of User Defined
- **Peripherals** – DVR, Print and Store Options, and Setup configuration
- **User Configurable Key** – User Defined keys, Hot keys
- **About** – System software, patent, and image information

## Changing system parameters

To change system parameters:

1. On the touch panel, select ***Utility***.
2. On the touch panel, select ***System***.

   The System screen is displayed.
3. On the monitor display, move the **Trackball** to select the tab that has the information you want to change.
4. Select values for the parameters you want to change.
5. To save the changes, select the ***Save*** button. Select ***Exit*** to return to scanning. In some cases, you may need to reboot the system for the change to take effect.

## System/General Preset Menu

The System/General screen allows you to specify hospital name and system date and time.

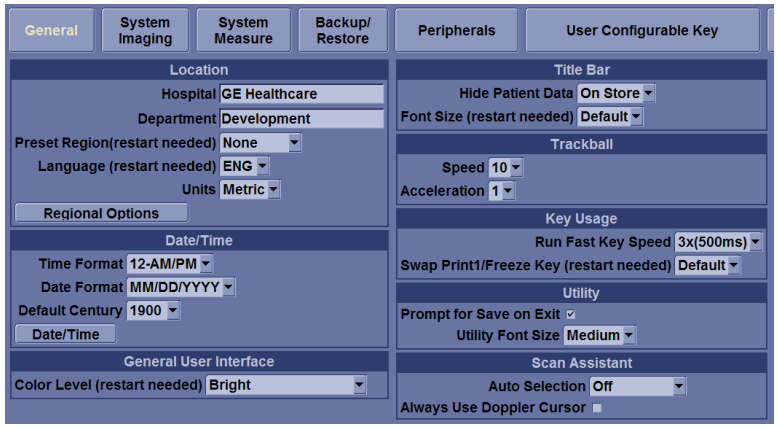



Figure 16-2. System/General Preset Menu

Table 16-1: Location

| Preset Parameter | Description |
|---|---|
| Hospital | Type the institution's name. |
| Department | Type the institution's department name. |
| Preset Region (restart needed) | Select region (None, Americas, Asia, Europe or Japan). |
| Language (restart needed) | Select the appropriate language from the drop-down list.<br>Note: If you select Japanese (JPN), only the warning and status messages are displayed in Japanese. You can not type in Japanese. |
| Units | Select metric or US units of measurement. |
| Regional Options | Select to set up the keyboard. |

Table 16-2: Date and Time

| Preset Parameter | Description |
|---|---|
| Time Format | Select the time format: 12 Hr. AM/PM or 24 Hr. |

Table 16-2: Date and Time (Continued)

| Preset Parameter | Description |
|---|---|
| Date Format | Select the date format: dd/mm/yyyy, mm/dd/yyyy, or yyyy/mm/dd. |
| Default Century | Select the default century for the system to use. |
| Date/Time | Select to display the Date/Time Properties window, to specify the system date, time, time zone, and to auto adjust for daylight savings time. |

Table 16-3: General User Interface

| Preset Parameter | Description |
|---|---|
| Color Level (requires reboot) | Select System Color according to the condition of the room. |

Table 16-4: Title Bar

| Preset Parameter | Description |
|---|---|
| Hide Patient Data | When set to Always, patient information is removed from the scanning screen Title bar and when storing images; or you can set this to remove patient information only when storing the image (On Store); or Never.<br>Note: Upon recall of images with measurements, Dual image, the DICOM image is recalled. In this case, there is no patient data burned into the DICOM image. If you DO NOT want this to occur, set this to Never. |
| Font Size (reboot) | Select to display patient information in the title bar using a small, medium, or large font size. You need to reboot the system for this change to take effect. |

Table 16-5: Trackball

| Preset Parameter | Description |
|---|---|
| Speed | Set how fast you want the Trackball to move while performing actions such as tracing the anatomy. 0=Slow; 20=Very Fast |
| Acceleration | Set how fast you want to trackball to move across the display. 0, 1, and 2 with 0 being the slowest acceleration. |

Table 16-6: Key Usage

| Preset Parameter | Description |
|---|---|
| Run Fast Key speed | Select the maximum value of the key interval when running Fast Key. |
| Swap Print1/Freeze Key (requires reboot) | Swap the control between Print 1 and Freeze key. |

Table 16-7: Utility

| Preset Parameter | Description |
|---|---|
| Prompt for Save on Exit | If selected, the system prompts you to save data when you select exit without saving. |
| Utility Font Size | Select the font size you want to use to view the Utility menus: Small, Medium, or Large. |

Table 16-8: Scan Assistant

| Preset Parameter | Description |
|---|---|
| Auto Selection | Off, Category, or Description.<br>• **Off**. The Scan Assistant selection on the Patient screen is completely manual. It will say "None" when starting a new patient and you can make a selection manually if desired.<br>• **Category**. Scan Assistant uses the combination of exam category (Abd, OB, etc.) and the currently-selected user to automatically select a Scan Assistant program. It chooses the same program that was used the last time this combination of exam category and user. The user can manually override this auto selection.<br>• **Description**. Scan Assistant uses the combination of the exam description (often auto fills in if the patient was selected from the worklist) and the currently selected user to automatically select a Scan Assistant program. It will choose the same program that was used the last time this combination of exam description and user was selected. The user can manually override this auto selection. If the exam description is blank then it will do the auto selection based on Category as described in the previous paragraph. |

Table 16-8: Scan Assistant (Continued)

| Preset Parameter | Description |
|---|---|
| Always Use Doppler Cursor | Use the Doppler Cursor when you activate Scan Assistant. |

## Foreign Language Keyboard Setup

### Keyboard Setup for non-Russian/Greek Languages

To set up the keyboard for non-Russian/Greek languages:

*NOTE: You must apply the changes on each setup page before moving to the next page.*

1. In Utility--> System--> General, set the Language as desired. Save this setting, but do not reboot the system yet.
2. Press ***Regional Options***, select the Language tab, press ***Details***, under Installed Services press ***Add*** to set the Keyboard layout/IME to United States-International, press ***OK***, set the Default input language to English (United States) - United States International, press ***Apply***, Press ***OK***.

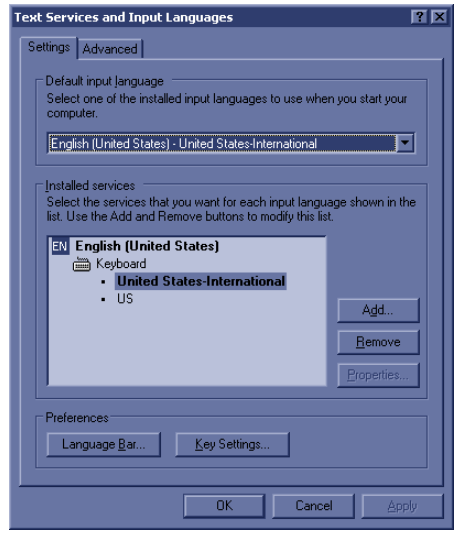



Figure 16-3. Selecting the International Keyboard

**Keyboard Setup for non-Russian/Greek Languages (continued)**

3. Select the Advanced tab, then select the language in the Language for non-Unicode programs pull-down menu. Press ***Apply***. Answer ***Yes*** to use files already loaded on the hard disk, then answer ***No*** to not reboot the system yet, press ***OK***. Press ***Save*** and Exit the Utility screen.

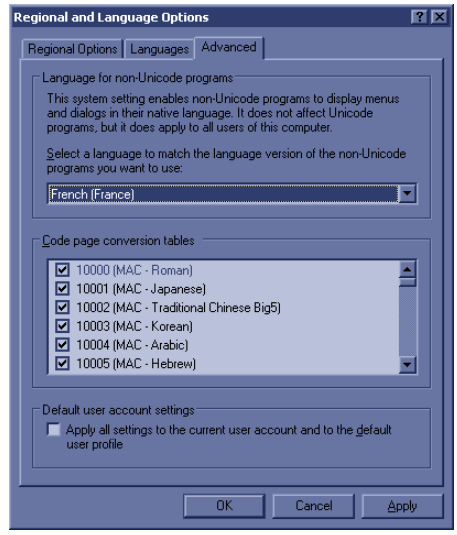



Figure 16-4. Set Language

4. Reboot the system. When your system restarts, the system appears in the selected language.
5. To type foreign characters, press Ctrl+Shift to change the keyboard to the international keyboard, then press the Alt GR+appropriate keyboard key.

**Keyboard Setup Procedure for Russian and Greek**

1. In Utility--> System--> General, set the Language as Russian or Greek. Save this setting, but do not reboot the system yet.

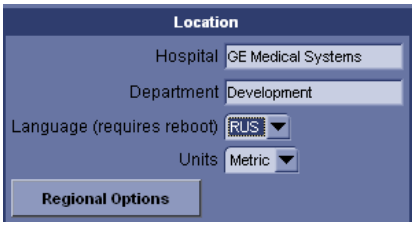



Figure 16-5. Changing the System Language to Russian/ Greek

**Keyboard Setup Procedure for Russian and Greek (continued)**

2. Press ***Regional Options***, under Standards and Formats select Russian or Greek, under Location select Russia or Greece. Press ***Apply***.

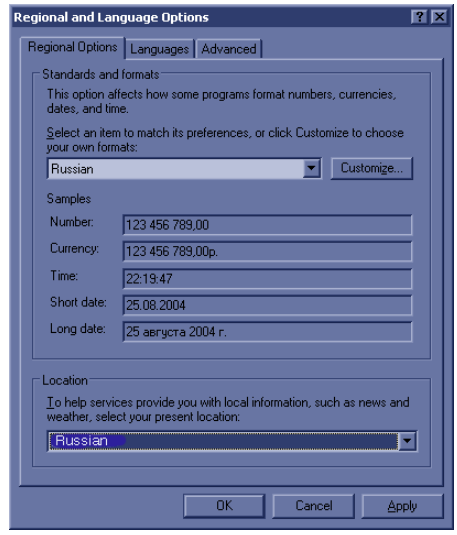



Figure 16-6. Regional Options

3. Select the Language tab, press ***Details***, under Installed Services select the Russian or Greek keyboard, under Default input language select Russian - Russian or Greek - Greek, press ***Apply***, Press ***OK***.

**Keyboard Setup Procedure for Russian and Greek (continued)**

4. Select the Advanced tab, then select Russian or Greek in the Language for non-Unicode programs pull-down menu. Press ***Apply***. Answer ***Yes*** to use files already loaded on the hard disk, then answer ***No*** to not reboot the system yet, press ***OK***. Press ***Save*** and Exit the Utility screen.

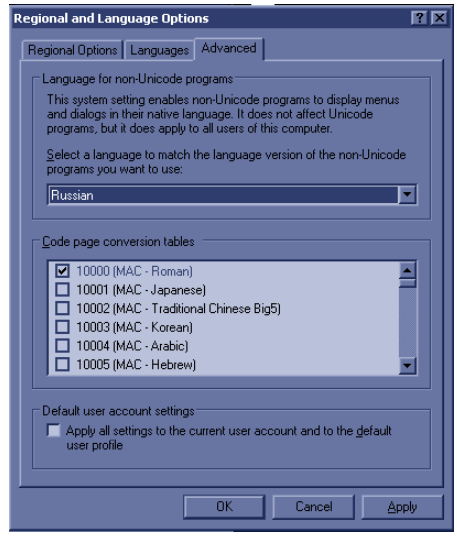



Figure 16-7. Set Language

5. Reboot the system. When your system restarts, the system appears in the selected language.
6. To switch between the English and Russian (or Greek) keyboard, press Alt+Shift to change the keyboard to the Russian or Greek keyboard.
7. Apply the changes by pressing ***Apply***. Press ***OK*** TWICE.

*NOTE: To have the settings take effect, you **MUST** turn off the system and turn it back on.*

*NOTE: Service password does not work for Greek and Russian language settings. Change the setting to English.*

**Keyboard Setup Procedure for Russian and Greek (continued)**

Here is an example of the Russian keyboard:

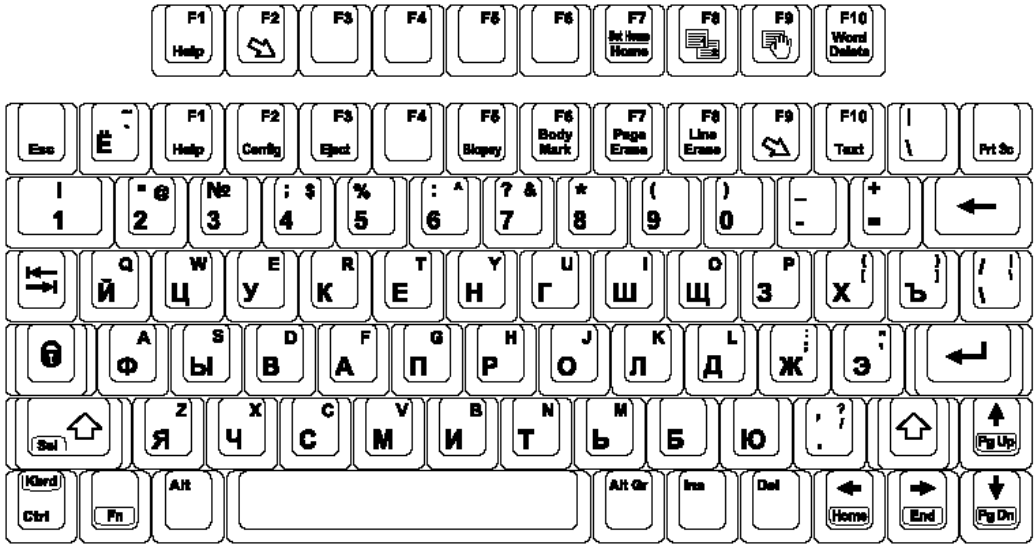


Figure 16-8. Russian Keyboard

Here is an example of the Greek keyboard:

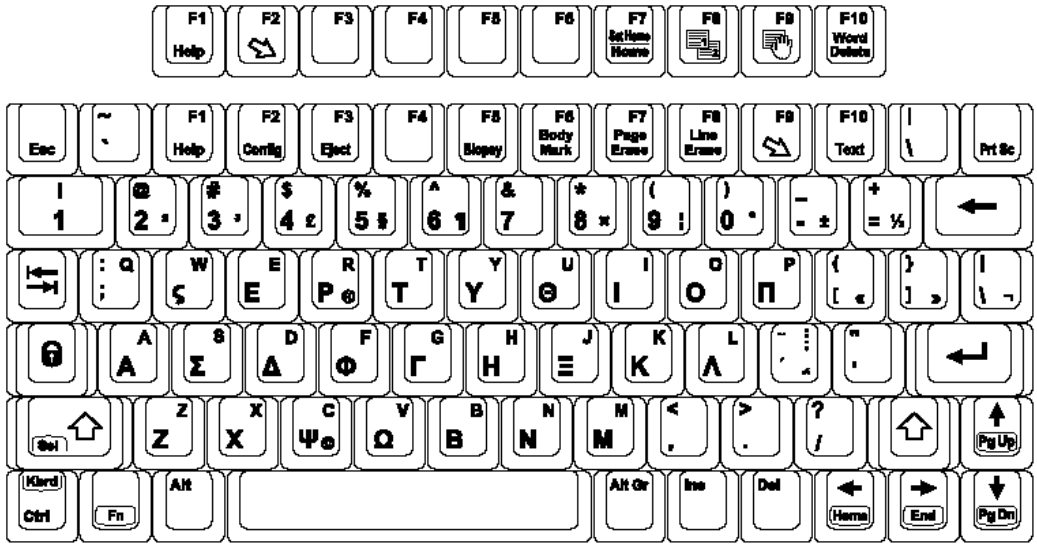


Figure 16-9. Greek Keyboard

**System Setup Procedure to display the messages in Japanese**

To setup the system to display the messages in Japanese;

*NOTE: You can not enter text in Japanese.*

1. Press ***Regional Options*** in Utility--> System--> General. Select the Advanced tab, then select Japanese in the Language for non-Unicode programs pull-down menu. Press ***Apply***.

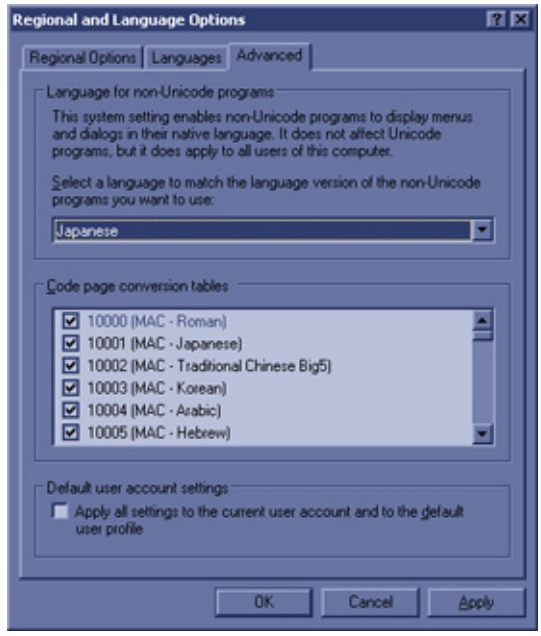



Figure 16-10. Advanced tab

2. Answer ***Yes*** to use files already loaded on the hard disk.

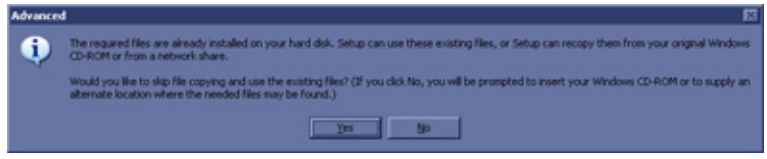



Figure 16-11. Message 1

**System Setup Procedure to display the messages in Japanese (continued)**

3. Then answer ***No*** to not reboot the system yet, press ***OK***. Press ***Save*** and Exit the Utility screen.

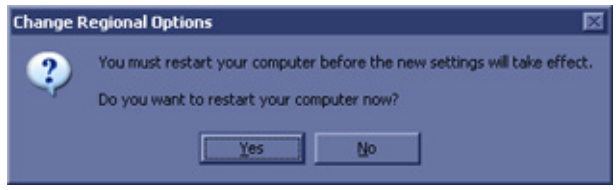



Figure 16-12. Message 2

4. Reboot the system.
5. Select the Language tab, press ***Details***.

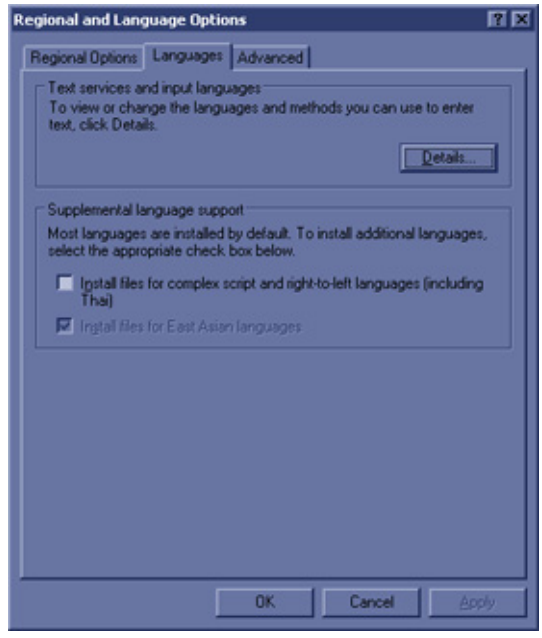



Figure 16-13. Language tab

**System Setup Procedure to display the messages in Japanese (continued)**

6. Select English (United States) - United States International in Default input language pull-down menu.

Figure 16-14. Test Services and Input Languages tab

**System Setup Procedure to display the messages in Japanese (continued)**

7. Select Japanese in Installed services and press ***Remove***. Press ***Apply***, then press ***OK***.

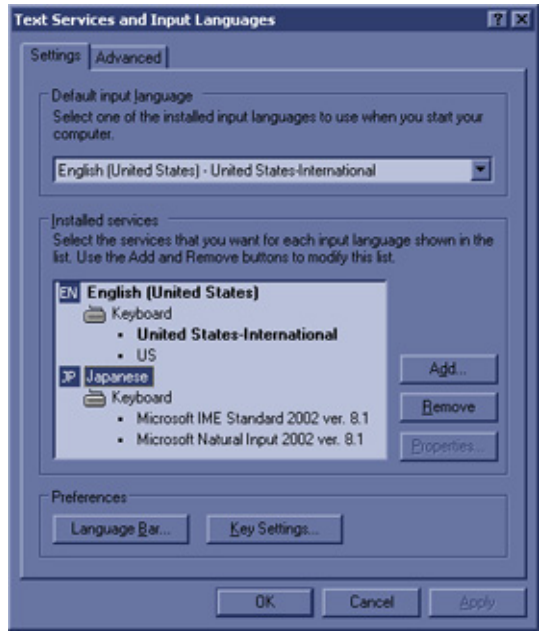



Figure 16-15. Remove Japanese

## System/System Imaging Preset Menu

The System/System Imaging screen allows you to specify parameters for patient information, key usage, and image control and display.

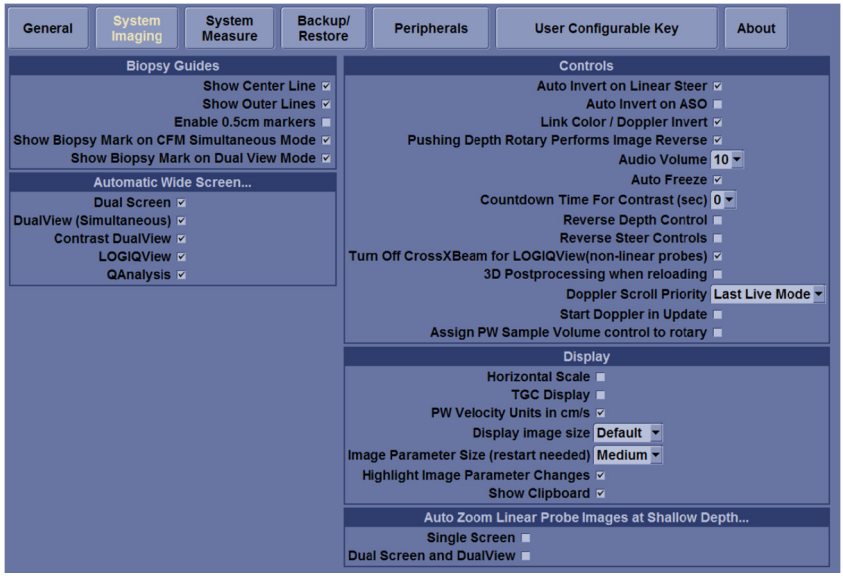



Figure 16-16. System/System Imaging Preset Menu

Table 16-9: Biopsy Guides

| Preset Parameter | Description |
|---|---|
| Show Center Line | Displays center biopsy guideline. |
| Show Outer Lines | Displays outer biopsy guidelines. |
| Enable 0.5cm markers | Activates biopsy depth markers every 0.5cm. |
| Show Biopsy Mark on CFM Simultaneous Mode | Displays the Biopsy Guideline on the image while in Simultaneous Mode. |
| Show Biopsy Mark on TAD Dual View Mode | Displays the Biopsy Guideline on the image while in TAD Dual View Mode. |

Table 16-10: Automatic Wide Screen...

| Preset Parameter | Description |
|---|---|
| Dual Screen | Automatically switch to Wide Screen when in Dual Screen. |
| DualView (Simultaneous) | Automatically switch to Wide Screen when in Simultaneous DualView Screen. |
| Contrast DualView | Automatically switch to Wide Screen when in Contrast DualView Screen. |
| LOGIQView | Automatically switch to Wide Screen when in LOGIQView. |
| QAnalysis | Automatically switch to Wide Screen when in QAnalysis. |

Table 16-11: Controls

| **Preset Parameter** | **Description** |
|---|---|
| Auto Invert on Linear Steer | When selected, for auto calcs, automatically inverts the timeline if needed when using ASO. |
| Auto Invert on ASO | Automatically inverts the spectrum with ASO. |
| Link Color/Doppler Invert | When selected, the Doppler timeline scale inverts along with the color ROI. |
| Pushing Depth Rotary Performs Image Reverse | When selected, you can reverse the image when you push down on the Depth rotary. |
| Audio Volume | Adjusts the Doppler audio volume via a drop-down menu (for example, 0=softer; 20=louder). |
| Auto Freeze | Automatically freezes the system after 15 minutes of inactivity. |
| Countdown Time For Contrast (Sec) | Specify time for the Contrast Clock to countdown during a contrast study, 0 (off), 3, and 5 seconds. |
| Reverse Depth Control | Changes key direction for the Depth control. |
| Reverse Steer Controls | Changes key direction for the Steer controls. |

Table 16-11: Controls (Continued)

| Preset Parameter | Description |
|---|---|
| Turn Off CrossXBeam for LOGIQView (non-linear probe) | Deactivates CrossXBeam when you activate LOGIQView. |
| 3D Postprocessing when reloading | When selected, the system re-processes the recalled 3D CINE Loop. |
| Doppler Scroll Priority | Set to 2D, Doppler, or Last Live Mode. |
| Start Doppler in Update | Select to allow the B/CF image to continue live while the PW image is frozen in triplex. |
| Assign PW Sample Volume control to rotary | Select to assign PW Sample Volume control to rotary. |

Table 16-12: Display

| Preset Parameter | Description |
|---|---|
| Horizontal Scale | Select to display width markers. |
| TGC Display | Select to display TGC curve. |
| PW Velocity Units in cm/s | Select to change scale on timeline from centimeters per second to meters per second. |
| Display image size (restart needed) | Select Default, Medium or Large. |
| Image Parameter Size (restart needed) | Choose Small, Medium, or Large. Must reboot the system. |
| Highlight Image Parameter Changes | Select if you want the display to indicate which controls you adjusted by highlighting the new value on the display. |
| Show Clipboard | Deselect to hide the clipboard. |

Table 16-13: Auto Zoom Linear Probe Images at Shallow Depth...

| Preset Parameter | Description |
|---|---|
| Single Screen | Automatically zoom linear probe images at a shallow depth on a single screen. |

Table 16-13: Auto Zoom Linear Probe Images at Shallow Depth... (Continued)

| Preset Parameter | Description |
|---|---|
| Dual Screen and DualView | Automatically zoom linear probe images at a shallow depth on the dual and DualView screen. |

## System/System Measure Preset Menu

The System/System Measure screen allows you to specify measurement parameters such as the type of default OB measurements and calculations. You can also define cursor and Results Window default functionality.

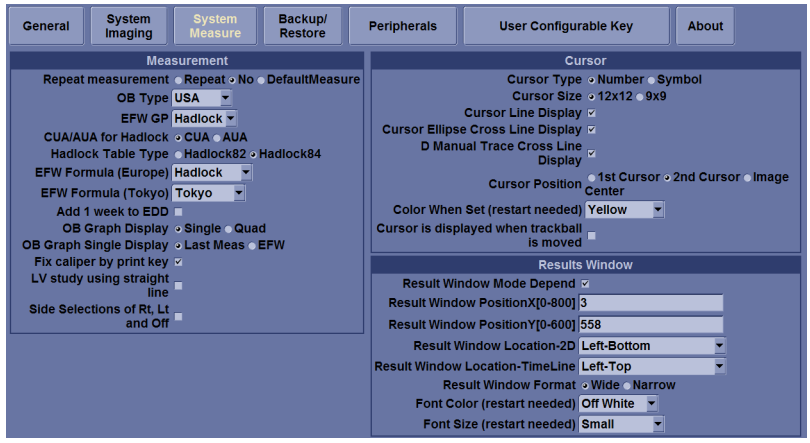



Figure 16-17. System/System Measure Preset Menu

Table 16-14: Measurement

| Preset Parameter | Description |
|---|---|
| Repeat Measurement | Select Off, Repeat, DefaultMeas |
| OB Type | Select which OB measurements and calculations studies to use: USA, Europe, Tokyo, Osaka, or ASUM. |
| EFW GP | Select the source used to calculate EFW-GP Estimated Fetal Weight-Growth Percentile) |
| CUA/AUA for Hadlock | Select to use CUA (Composite Ultrasound Age) or AUA (Average Ultrasound Age) as the default |
| Hadlock Table Type | Select Hadlock 82 or Hadlock 84 tables |
| EFW Formula (Europe) | Select the source used to calculate EFW (Europe) (Estimated Fetal Weight), Shepard, Merz, Hadlock, German, Rich |
| EFW Formula (Tokyo) | Select the source used to calculate EFW (Tokyo) (Estimated Fetal Weight) |
| Add 1 week to EDD | Select to add additional week to estimated date of delivery |
| OB Graph Display | Select Single or Quad for displaying OB Graphs. |

Table 16-14: Measurement

| Preset Parameter | Description |
|---|---|
| OB Graph Single Display | Select Last Meas or EFW Single OB Graph displayed by default. |
| Fix Caliper by Print key | Select to use the Print key like the Set key.<br>*NOTE: If you select this during a generic volume measurement, the print key does not function like the Set key, but instead ends the measurement sequence and initiates the volume calculation based on the number of measurements taken so far.* |
| LV Study using straight line | Sets straight line as the default for 2D LV studies. |
| Side selections of Rt, Lt and Off | Select to use “Rt, Lt and Off” for Side Selection. When not selected, displays only “Rt and Lt”. |

Table 16-15: Cursor

| Preset Parameter | Description |
|---|---|
| Cursor Type | Select whether to mark measurements with numbers or symbols. |
| Cursor Size | Specify 12x12 or 9x9. |
| Cursor Line Display | If selected, after you press Set to complete a measurement, the cursor line is displayed. If not selected, after you press Set to complete a measurement, only the cursor number or symbol is displayed. |
| Cursor Ellipse Cross Line Display | Check box to display the cross line in Ellipse. |
| D Manual Trace Cross Line Display | Check box to display the cross line with the caliper. |
| Cursor Position | Select 1st Cursor, 2nd Cursor, or Image Center. |
| Color When Set (reboot) | Select white, yellow, bright red, or orange. |
| Cursor is Displayed when Trackball is Moved | The active cursor does not display until you move the Trackball. This assumes the following presets are set: Repeat Measurement, Repeat, Default Measurement, and Cursor. |

Table 16-16: Results Window

| Preset Parameter | Description |
|---|---|
| Result Window Mode Depend | Select this if you want the measurement result window to be repositioned, depending on the mode. |
| Result Window Position X[0-800] | You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the X coordinate (left/right) |
| Result Window Position Y[0-600] | You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the Y coordinate (up/down) |
| Result Window Location-2D | Select the Result Window location on the Monitor Display: Left-Bottom, Left-Top, Right-Bottom, or Right-Top. |
| Result Window Location-Timeline | Select the Result Window location: Left-Bottom, Left-Top, Right-Bottom, or Right-Top. |
| Result Window Format | Select Wide or Narrow. |
| Font Color (reboot) | Select White, Off White, Yellow, Bright Red or Orange (reboots the system) |
| Font Size (reboot) | Select small, medium, or large (reboots the system) |

## System/Backup and Restore Preset Menu

The backup and restore procedures described in this section are divided into two parts. The first part describes procedures to backup and restore patient data. The second part describes procedures to backup and restore system and user-defined configurations.

The Backup/Restore function enables the user to:

- Copy/Restore the patient archive.
- Copy/Restore the system configuration. The Copy/Restore system configuration feature enables the user to configure several units with identical presets, providing that the units have the same software version.

Depending on the system, you can use either a CD-R, DVD-R, USB Flash Drive, or USB Hard Disk for system backup/restore. For the sake of simplicity, we have used the CD-R in the following examples.

*NOTE: The system ONLY supports CD-R / DVD-R and DOES NOT support CD-RW / DVD+R.*

WARNING

GE Healthcare is not responsible for lost data if the suggested backup procedures are not followed and will not aid in the recovery of lost data.

WARNING

The LOGIQ S7 Expert/Pro is not intended to be used as a storage device; backup of the Patient and Image Database is your institution’s responsibility. GE is NOT responsible for any lost patient information or for lost images.

WARNING

The system crash can cause the HDD corruption.The HDD is not considered a permanent storage device. Backup data on a regular basis.

## System/Backup and Restore Preset Menu (continued)

To minimize accidental loss of data, perform EZBackup and Backup on a regular basis.

1. First, perform EZBackup to save the images.
2. Next, perform Backup at ***Utility -> System -> Backup/ Restore***. Enable the following checkboxes under Backup:
   - Patient Archive
   - Report Archive
   - User defined configuration
   - Service

Archived data is managed at the individual sites. Performing data backup (to any device) is recommended.

Make sure to verify the media after writing of data, such as EZBackup, SaveAs or Export.

Verifying media requires additional time, which varies depending on the amount of data backed up or exported.

Before deleting a patient or image from the patient screen, make sure you have saved the data by EZBackup/Backup or Export and verify that the media transfer of data was successful.

## System/Backup and Restore Preset Menu (continued)

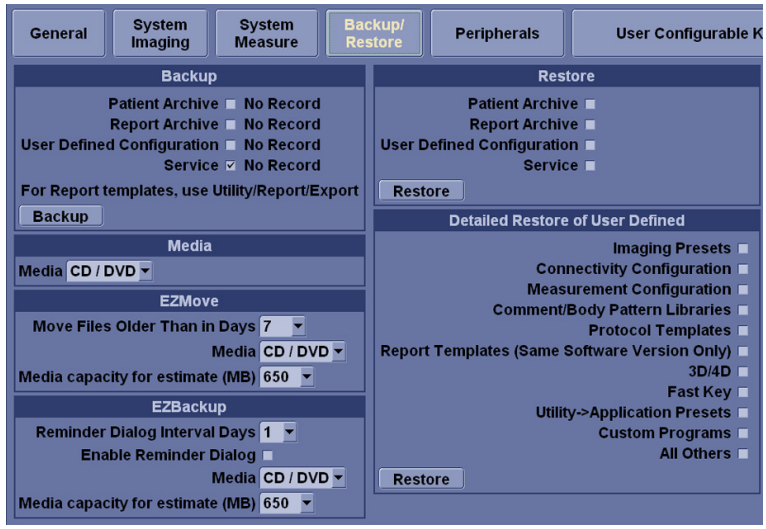



Figure 16-18. System/Backup/Restore Preset Menu

Table 16-17: Backup

| Preset Parameter | Description |
|---|---|
| Patient Archive | Select to back up patient data. |
| Report Archive | Select to back up report data. |
| User Defined Configuration | Select to back up the user-defined configuration settings. |
| Service | Select to back up Service (iLinq and Network) settings. |
| Backup | Select to begin the backup. |

Table 16-18: Media

| Preset Parameter | Description |
|---|---|
| Media | Select media type to use for backup and restore. |

Table 16-19: EZMove

| Preset Parameter | Description |
|---|---|
| Move Files Older Than in Days | The system will move images older than the number of days specified here. If you enter a zero (0), then all of the images from today on will be moved. |
| Media | Select media type. |
| Media capacity for estimate (MB) | Specify the capacity of the backup media. |

Table 16-20: EZBackup

| Preset Parameter | Description |
|---|---|
| Reminder Dialog Interval days (EZBackup only) | Specify the number of days after the last backup that you want the system to prompt you to perform an EZBackup/ EZMove procedure (only for moving images). |
| Enable Reminder Dialog (EZBackup only) | Select to activate the EZBackup/EZMove reminder pop-up dialog. |
| Media | Select media type. |
| Media capacity for estimate (MB) | Specify the capacity of the backup media. |

Table 16-21: Restore

| Preset Parameter | Description |
|---|---|
| Patient Archive | Select to restore patient data. |
| Report Archive | Select to restore report data. |
| User Defined Configuration | Select to restore the user-defined configuration settings. |
| Service | Select to restore service iLinq and Network settings.<br>**CAUTION**: DO NOT restore service presets on to a different LOGIQ S7 Expert/Pro system. Only restore service presets to the same system. |

Table 16-21: Restore (Continued)

| Preset Parameter | Description |
|---|---|
| Restore | Select to begin the restore process for the selected configuration files. |

## System/Backup and Restore Preset Menu (continued)

The detailed section of this menu allows you to restore one area at a time from the user defined configuration. This allows you to selectively restore what you want to restore across multiple machines. Check the box(es) you want to restore, insert the appropriate media, and press Restore.

*NOTE: When you restore backup data from the Utility menu, the LOGIQ S7 Expert/Pro application usually restarts automatically when the restoring is complete.*

Table 16-22: Detailed Restore

| Preset Parameter | Description |
|---|---|
| Imaging Presets | Select to restore imaging presets. |
| Connectivity Configuration | Select to restore connectivity configurations. |
| Measurement Configuration | Select to restore measurement configurations. |
| Comment/Body Pattern Libraries | Select to restore comment and body pattern configurations. |
| Protocol Template | Select to restore Protocol Template. |
| Report Templates (Same software version only) | Select to restore Report templates. |
| 3D/4D | Select to restore 3D. |
| Fast Key | Select to restore Fast Key. |
| Utility-->Application Presets | Select to restore Utility--> Application presets. |
| Custom Programs | Select to restore Scan Assistant programs. |

Table 16-22: Detailed Restore (Continued)

| Preset Parameter | Description |
|---|---|
| All Others | Select to restore all other configurations not listed in the Detailed Restore section. This includes parameters defined on the System preset menus. |
| Restore | Select to begin the restore process for the selected configuration files. |

## Backup and Restore

To minimize accidental loss of data, perform backup of the patient archives stored on the local hard drive **DAILY** as described in this section. Use a formatted Backup/Restore disk to back up patient archives from the hard drive, using the backup procedure described in this section. Data from the Backup/Restore disk may be restored to the local hard drive using the restore procedure.

*NOTE: To perform backup and restore procedures, you must login with administrator privileges.*

**Backup procedure**

Back up patient data AFTER you've archived (via EZBackup/ EZMove) images so that the pointers to the patient's images reflect that the images have been moved to removable media and are no longer on the hard drive.

1. Insert a media into the drive or USB device into a USB port.

*NOTE: For information about formatting media, see 'Formatting removable media' on page 16-114.*

2. In the patient screen, select the dataflow Local Archive - Int. HD.
3. On the touch panel, press ***Utility***.
4. On the Utility touch panel, press ***System***.
5. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.
6. In the Backup list,
   - Select **Patient Archive** and **Report Archive** to backup the patient records.
   - Select **User Defined Configuration** to copy system settings and user presets.

*NOTE: The detailed section of this menu decouples the user defined configuration above. This allows you to selectively restore what you want to restore across multiple machines.*

7. Specify where to save data in the media field.
8. Select ***Backup***.

   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.
9. At the end of the process, the Backup completed message is displayed on the monitor.

   Press **Eject** (F3) for eject media/disconnect USB.
10. Make sure to physically label the media. An identification of the system should also be noted on the media and a backup log should be kept.

    File the media in a safe place.

**Restore procedure**

CAUTION

The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct media.

You cannot restore the data between systems with different software versions.

CAUTION

To avoid the risk of overwriting the local patient and report archives, DO NOT check Patient Archive when restoring user-defined configurations.

1. On the touch panel, press ***Utility***.
2. On the Utility touch panel, press ***System***.
3. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.
4. In the Restore list,
   - Select **Patient Archive** and **Report Archive** to restore the patient archive.
   - Select **User Defined Configuration** to restore all system settings and user presets.

     or

     One or several system configuration items to restore parts of the Detailed Restore of User Defined.
5. In the Media field, select the appropriate Source device.
6. Select ***Restore***.

   The system performs the restore. As it proceeds, status information is displayed on the Backup/Restore screen.
7. The LOGIQ S7 Expert/Pro restarts automatically when Restore is done.

## Backup and restore strategy: user-defined configurations

In addition to generating a safety copy, the backup/restore function of the user-defined configuration (presets) can be used to configure several LOGIQ S7 Expert/Pro systems with identical presets (preset synchronization).

### Preset synchronization

The procedure for preset synchronization of several scanners is as follow:

1. Make a backup of the user-defined configurations on a removable media from a fully configured LOGIQ S7 Expert/Pro system.
2. Restore user-defined configurations from the removable media to another LOGIQ S7 Expert/Pro system (you can restore all the user-defined presets or select specific presets to restore via Detailed Restore).

## EZBackup and EZMove

EZBackup or EZMove allows you to manage hard disk space (move images off the hard drive) while maintaining the patient database on the scanner, as well as to back up the patient database and images.

- **EZBackup**: Copy the data from the local HDD to the removable media.
- **EZMove**: Copy the data from the local HDD to the removable media. After copying the image file to the media, EZMove deletes the image file from the Local HD.

HINTS

PLEASE READ THIS

Ensure that you have established a data management protocol for your office/institution. You MUST manage the backup media by keeping a log and by creating a media filing system.

For example, if you need to back up 500 MB/day, or 2.5 GB/week, then you need to back up 5 CDs/week, or ~250CDs/year.

Generally speaking, you should back up the system when you have 10 GB of images to back up.

You should assign the person who is in charge of performing the backups. Backups will vary by the volume of your work. You need to track how long it takes your office/institution to get to 10 GB, and set the back-up parameters accordingly.

Your office/institution needs to determine your backup strategy, for instance, backup weekly and move monthly. It should be an easy strategy to perform and to remember. And follow this same strategy/schedule consistently.

It’s also useful to keep your more recent information on the hard drive since it’s easier to recall that way.

**EZBackup and EZMove (continued)**

You can still do a backup/move daily; but ALWAYS do a patient archive backup after each move.

Only cancel the backup/move in case of an emergency. The system completes backing up the current media and then cancels the operation.

When EZBackup requires more than one disk (CD-R or DVD-R) for backup, a message appears when the first disk is full. If you select “Cancel” to stop the backup procedure and later try EZBackup again, all the data may not be backed up.

Select “Full Backup” on the first EZBackup wizard screen if the last time you were performing EZBackup you selected “Cancel”.

If you use EZBackup or EZMove as a “true” patient archive, you must maintain a separate backup of the patient database (Patient Archive and Report Archive). If for any reason the Local Archive - Int HD gets corrupted or the base system software has to be reloaded, then the patient archive is the ONLY way to rebuild the EZBackup and EZMove patient archive.

DO NOT turn off the power while EZBackup is running. The data may be lost. It may take several hours for EZBackup to finish, depending on the amount of data being backed up.

The following may give the impression of a lockup, but EZBackup is continuing in the background.

- The progress bar does not move.
- The screen may become white.
- The hourglass icon keep turning.

## EZBackup and EZMove (continued)

CAUTION NEVER restore the patient archive from media made previous to the last move.

*NOTE: EZBackup/EZMove are saved data as RAW data. If you import data to the system, you can modify the image data.*

*NOTE: To display exported Raw DICOM images on a PC, you need the dedicated viewer.*

*NOTE: When backing up or moving reports using EZBackup and EZMove, use the USB HDD. DVDs and CDs are not supported for backing up or moving reports using EZBackup and EZMove.*

*NOTE: "Archived" information is saved to each exam during EZBackup. When you perform EZBackup, the system backs up the exams except for the archived exam.*

*NOTE: EZBackup/EZMove cannot span a single image across two (2) or more media. Therefore, if EZBackup/EZMove encounters an image that is greater than the capacity of the media, it skips the oversized image.*

*NOTE: EZBackup/EZMove does not store images to media in sequential order. Instead it maximizes the most amount of images per media.*

*NOTE: If the system locks up during the media auto format process, shutdown the system by holding down the power button and boot it up again. After the system is up, replace the media to a new one and execute EZBackup or EZMove again. To avoid data loss, do not reuse the failed media for any other function.*

*NOTE: If you try exporting a previously backed-up exam, the message "Can't Find Source file" displays. The image data had already been removed from the hard disk drive with EZBackup/EZMove.*

## EZBackup and EZMove (continued)

Basically, when you perform the EZBackup or EZMove procedure, you insert the media (or connect USB HDD if applicable), the system backs up/moves the images, and creates a reference between the patient database and the media's volume.

*NOTE: EZBackup/EZMove can take up to 20 minutes (or longer, depending on the size of the backup). Make sure to schedule this at the same time daily, when no patients are scheduled.*

1. Prepare unformatted media or the USB HDD before starting EZBackup/EZMove.

*NOTE: BEFORE starting the EZBackup, select "Unlock All" in Utility --> Admin --> Logon.*

2. Specify the EZBackup/EZMove setup on the Utility --> System --> Backup/Restore page.

## EZBackup and EZMove (continued)

3. To start the EZBackup/EZMove procedure, go to the Patient menu and select EZBackup/EZMove. The EZBackup/ EZMove Wizard starts.

*NOTE: If you use the USB HDD, some wizards and the pop-up messages DO NOT appear.*

Figure 16-19. Patient Screen

## EZBackup and EZMove (continued)

4. Verify the information on the first page of the EZBackup/ EZMove Wizard, then press *Next*.

   Full backup options display on the first page of the EZBackup wizard. If you want to backup all of the exams in the range (even if the exam was previously backed up, check this option).

   EZBackup does not back up the exams which were previously backed up once by EZBackup or Export.

*NOTE: You can set the range for EZMove in Utility --> System --> Backup/Restore --> Move files older than in days.*

*NOTE: If you update an exam which is already backed up, the exam is also backed up.*

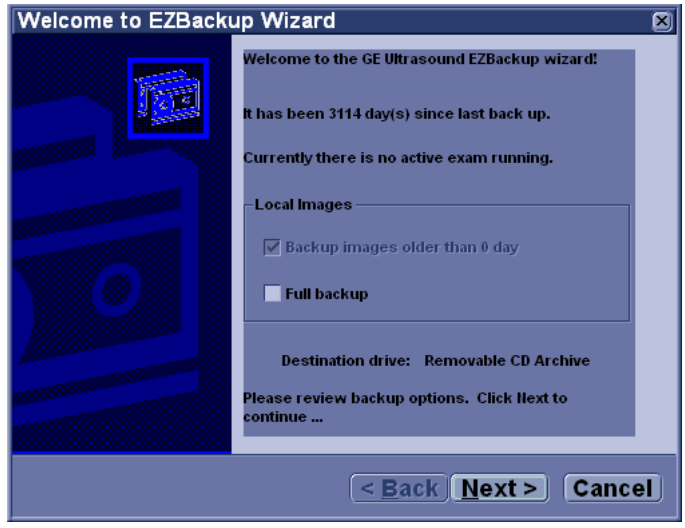



Figure 16-20. EZBackup/EZMove Wizard, Page 1

## EZBackup and EZMove (continued)

5. Verify the information on the EZBackup/EZMove Wizard, Page 2. The backup may span multiple media. This page tells you how many media you need to do this backup. After you have gathered the media (allow for one extra media, just in case), you are ready to begin the backup. Press *Next*.

   Free Space/Total Size: tells you the size of the data you have selected to store/and the total size of the USB Hard Drive storage media. If the storage capacity of the USB HD is insufficient, you will see the message, “Selected Location does not have enough free space.”

*NOTE: The calculation for the number of backup CDs is only an estimate. Allow for one additional CD when performing an EZBackup/EZMove.*

*NOTE: This message appears if you press Next without inserting the backup media: “Please insert a blank media...”. Insert the media and continue.*

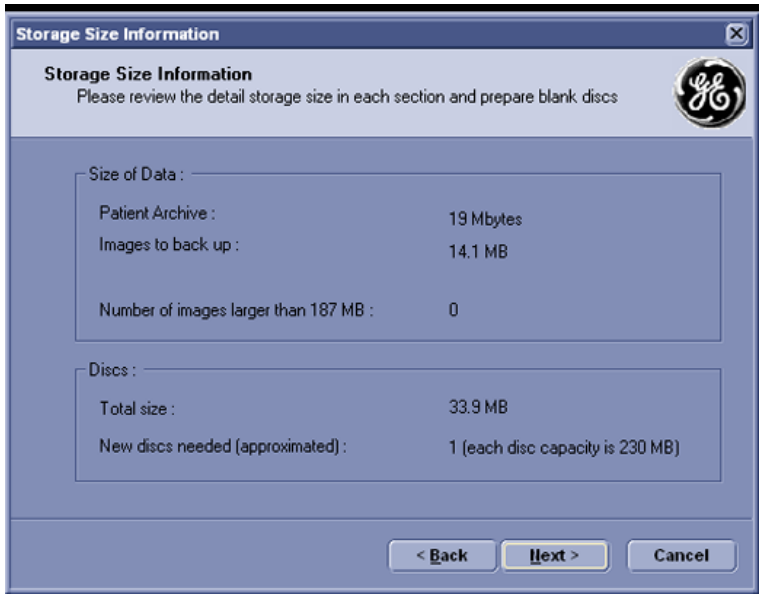



Figure 16-21. EZBackup/EZMove Wizard, Page 2

## EZBackup and EZMove (continued)

6. A pop-up message appears that provides you with the media label. Label the media, then insert the media. Press *OK*.

Figure 16-22. Insert Media Message

a. Ensure that you label the media with not only the volume name indicated on the Insert Media Message, but with the name of the LOGIQ S7 Expert/Pro system where this backup/move procedure was done.
b. Update the EZBackup/EZMove log with this information the volume information and the location of the media.
c. After the backup/move has been completed, file the media.

Table 16-23: Typical EZBackup/EZMove Log

| Date | Scanner ID Name | Backup Images Y/N | Older than __ Days | Move Images Y/N | Media Label (and Scanner ID) |
|---|---|---|---|---|---|
| | | | | | |

## EZBackup and EZMove (continued)

7. The status menu appears. When the backup/move has been completed, press *Next*.

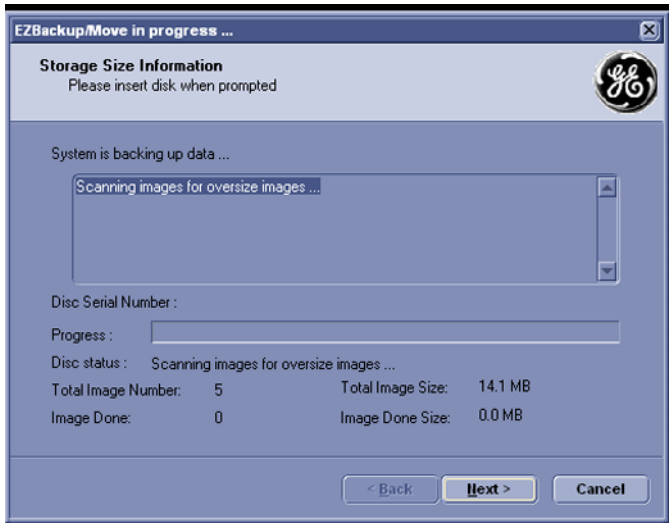



Figure 16-23. EZBackup Wizard Page 3

*NOTE: When/if you need to insert the next media, a message appears providing you with the media label. Label the media, then insert the next media and press OK.*

## EZBackup and EZMove (continued)

8. When the backup is complete, the completed wizard page appears. Press *Finish*.

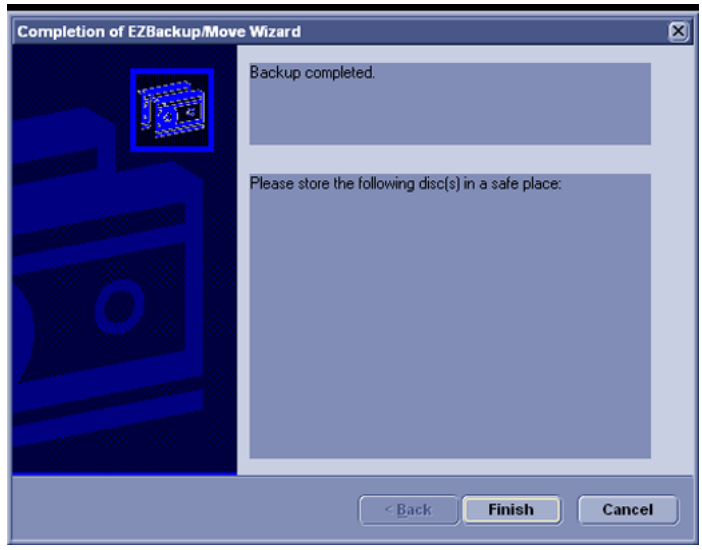



Figure 16-24. EZBackup/EZMove Wizard, Page 4

9. Do a patient archive after each EZBackup/EZMove (move).

   We recommend attaching the patient list to the EZBackup/EZMove media. Insert the media and select DICOM CD Read for dataflow (if you use a USB drive, select DICOM USB Drive Read). Select any patient and press the left Set key to print the patient list on the digital printer.

*NOTE:* *Use Import to restore EZBackup images.*

**To Review EZBacked Up/EZMoved Images**

You can review backed up media via the Patient Menu, Import, and the DICOM Read dataflow.

If you review an EZMoved image,

1. Select the patient on the Patient Menu (on the same system where the EZMove was performed).
2. Insert the media volume indicated on the Patient Menu.
3. View the exam from the media.

*NOTE: You may need to insert a media volume prior to or after the recommended media.*

*NOTE: If the patient is split over multiple media, images on the previous or next media are displayed as triangles.*

*NOTE: To view the whole patient on the system, use Import, from as many media as you have for that patient. However, take care not to import studies over existing studies; duplicate or missing images may result. Delete the existing exam first.*

## System/Peripherals Preset Menu

The System/Peripherals screen allows you to specify parameters for the DVR and printers.

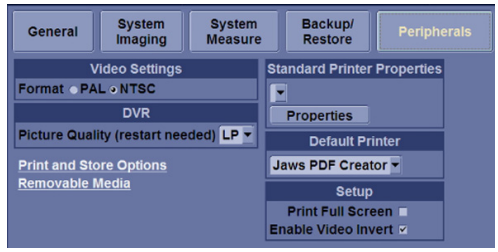



Figure 16-25. System/Peripherals Preset Menu

Table 16-24: Video Settings

| Preset Parameter | Description |
|---|---|
| Format | Select the video format, PAL or NTSC. |

Table 16-25: DVR

| Preset Parameter | Description |
|---|---|
| Picture Quality (restart needed) | EP, LP. Extended Play or Long Play. |

## System/Peripherals Preset Menu (continued)

Print and Store Options. Press Print and Store Options to go to the Utility --> Connectivity --> Miscellaneous setup page.

Removable Media. Press Removable Media to go to the Utility --> Connectivity --> Removable Media page.

Table 16-26: Setup

| Preset Parameter | Description |
|---|---|
| Standard Printer Properties: [Printer] and Properties, and<br>Default Printer | Select to add an additional standard printer via the USB serial port and to configure digital printers. This activates the Windows Add Printer wizard. NOTE: Most printer drivers are available via Windows; however, newer printers may require you to load the manufacturer-supplied print driver (must be on CD-ROM). Refer to the Basic Service Manual for more information. |
| Print Full Screen | Select for the standard printer to print the full screen. |
| Enable Video Invert | Select for the standard printer to print black on white rather than white on black. |

## System/User Configurable Key

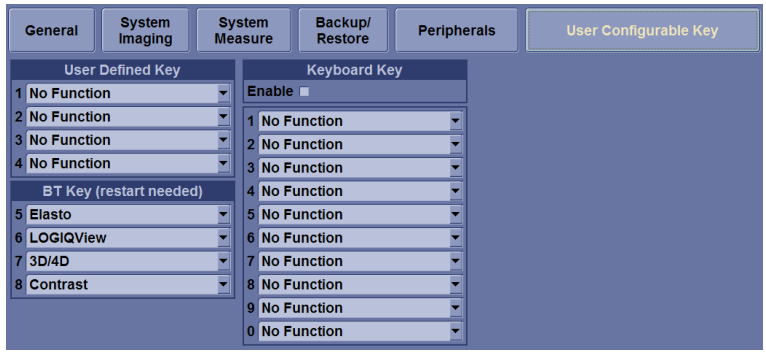



Figure 16-26. User Configurable Key Preset Menu

Figure 16-27. User Configurable Keys

1. BT Key
2. Keyboard Key
3. User Defined Key

### BT keys

You can arrange the order of BT key on the control panel as you have programmed in the Utility page. See ‘BT key arrangement’ on *page 3-45 for more information.*

### User Defined and Keyboard keys

User Defined and Keyboard Keys can be programmed as one of the following functions:

Table 16-27: Keyboard Key/User Defined Key

| Parameter | Description |
|---|---|
| No Function | No function. |
| Fast Key | Fast Key function can be assigned to the User Defined Key using F5 button. |
| Biopsy Guideline | Biopsy Guideline Display/change biopsy guide line. |
| Save As | Display SAVE AS menu to save image. |
| Active Images | Go to Active Images Screen. |
| Auto Dop. Calcs | Turn on/off Auto Calcs in Doppler mode. |
| Removable media | Go to Media format menu in Utility. |
| ECG On/Off | Turn on/off ECG. |
| OB Graph Display | Go to OB Graph page. |
| Clear Saved Measurements | Clear all measurements in the selected measurement category. Display the Confirmation dialogue before delete data. |
| CrossXBeam | Turn on/off CrossXBeam. |
| SRI HD | Turn on/off SRI HD. |
| Print4 | Assign Print 4. |
| Print5 | Assign Print 5. |
| Print6 | Assign Print 6. |
| Worksheet | Go to Worksheet page. |
| Permanent Store | Same as Permanent Store in Active Images Screen. |

Table 16-27: Keyboard Key/User Defined Key

| Parameter | Description |
|---|---|
| PDI | Turn on/off PDI mode. |
| CHI | Turn on/off CHI mode. |
| TVI | Turn on/off TVI mode. |
| Contrast Trigger | Switch Contrast Trigger status: ON/OFF |
| Video | Turn on/off Video tab. |

*NOTE: Some features can not assign to BT key.*

## System/About Preset Menu

The System/About screen lists information about the system software.

Table 16-28: Software

| Preset Parameter | Description |
|---|---|
| Software Version | The current software version on this system. |
| Software Part Number | The software part number. |
| Build View | The software build view. |
| Build Date | The software build date. |

Table 16-29: Patents

| Preset Parameter | Description |
|---|---|
| Patents | Lists system patents. |

Table 16-30: System Image

| Preset Parameter | Description |
|---|---|
| Image Part Number | The image part number (ghost part number). |
| Image Date | The image date (ghost date). |

# Imaging Presets

## Overview

Imaging screens allow you to specify parameters for the following:

- B-Mode (B)
- Color Flow Mode (CF)
- Power Doppler Imaging (PDI)
- Elastography (ELASTO)
- M-Mode (M)
- Anatomical M-Mode (AMM)
- Pulse Wave Mode (PW)
- Continuous Wave Mode (CW)
- Harmonics (HAR)
- B-Flow (BF)
- B-Flow Color (BFC)
- Contrast Reference (Ref)
- Contrast (CON)
- Tissue Velocity Imaging (TVI)
- Tissue Velocity Doppler (TVD)
- General

## Overview (continued)

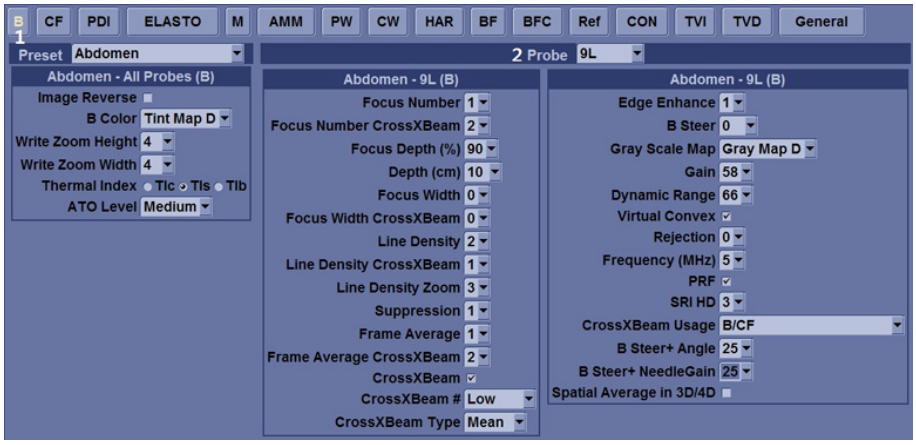



Figure 16-28. Imaging - Example

1. Model/application dependent setup parameters
2. Probe dependent setup parameters

## Changing imaging presets

To change imaging presets:

1. On the touch panel, select ***Utility***.
2. On the touch panel, select ***Imaging***.

   The system displays the Imaging screens.

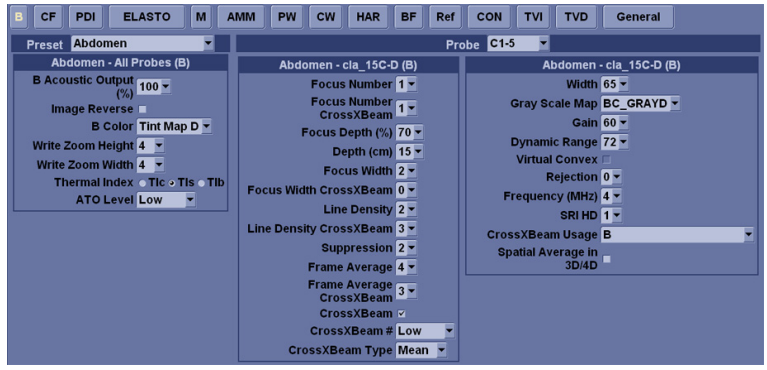



Figure 16-29. Example: B-Mode Preset

3. In the row across the top of the screen, select the mode.

   The system displays two sets of parameters and settings. The left column lists all settings for the exam (for example, Abdomen). The right column lists settings that apply only to the exam and probe combination.
4. In the Preset list, select the exam.
5. In the Probe list, select the probe.
6. To change a parameter, do one of the following:
   - Select the value from a list
   - Select one value from a choice of two or more buttons
   - Select or clear a check box
7. After changing the parameters, to save the changes, select the ***Save*** button.

*NOTE: When you Save changes to imaging parameters, the system saves changes to all modes, not just the mode currently displayed.*

*NOTE: If you have problems with imaging, you can return parameters back to the original settings. Select the exam, probe, and mode, and then select Reload Factory Defaults. The system returns the selected parameters to the original settings.*

For information about the specific parameters, refer to Chapter 5 Optimizing the Image.

## General

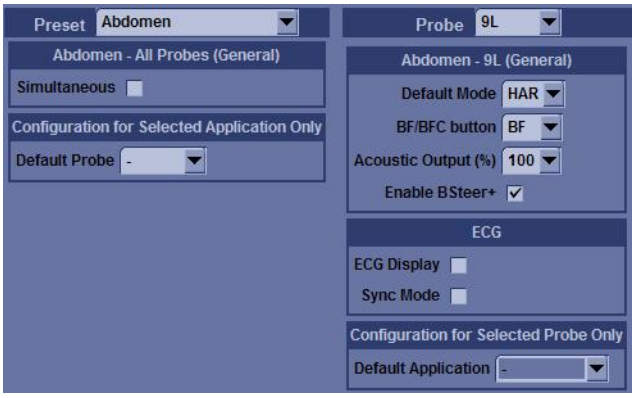



Figure 16-30. General Presets

You can specify a default probe per application and a default application per probe.

### Default probe per application

1. To specify a default probe per application, select Utility --> Imaging --> General.
2. Select the default probe from the pull-down menu.

### Default mode and application per probe

1. To specify a default application per probe, select Utility --> Imaging --> General.
2. Under Probe, specify the desired application from the pull-down menu.

## General (continued)

### Other setting

Checkmark the following fields when you want the system to activate a certain display:

- Simultaneous
- ECG
  - ECG Display
  - Sync Mode

If your system has the following options, you must assign the option to the button per application and probe.

- B or HAR(Harmonics)
- BF and BFC
- Acoustic Output (%)
- Enable B Steer+

*NOTE: If you use the user-defined preset as default preset, re-select the preset in Utility whenever you overwrite the user-defined preset.*

# Comments Libraries Presets

## Overview

Comment screens allow you to specify comment text and pointer options, to define comment libraries, and assign comment libraries to applications.

## Comments Libraries/Libraries Preset Menu

On the comments *Libraries* tab, you can change and create comment libraries. A comment library is a list of comments that are associated with a specific application. The comments are listed in the library in the order in which they display on the touch panel. For each library, you can define two touch panel displays of comments (Page1 and Page2), with 15 comments on each touch panel.

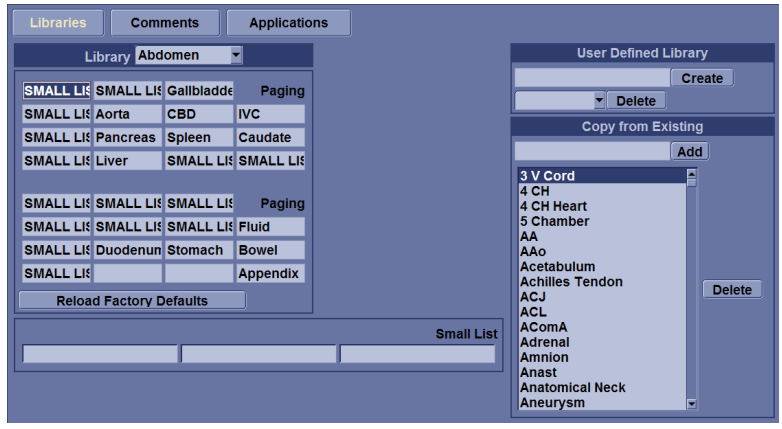



Figure 16-31. Comment Libraries Preset Menu

## Comments Libraries/Libraries Preset Menu (continued)

Table 16-31: Libraries

| Preset Parameter | Description |
|---|---|
| Library | The name of the comment library. |
| Paging | The first (or second) touch panel page of comments for the selected library. |
| Small List | Fields where you define a small list. |
| User Defined Library | The name of a new comment library that you want to create/ delete. |
| Copy from Existing | You can add to or delete from the selection of comments. |

### Defining Comments

1. In the *Library* field, select the library you want.

   The system displays all comments for the library. You can have two touch panel displays of comments for each library. The comments are listed in the order that they are shown on the touch panel when you use comments.
2. To change or add an comment, select the comment or blank location and press **Set**, then do one of the following:
   - Type the comment.
   - Select the comment in the *Copy from Existing* list, and press **Set**.
3. To save the changes, select the ***Save*** button.

### Creating a new comments library

1. In the *User Defined Library* field, type a name for the library, then select ***Create***.

   The system creates a new library.
2. Enter comments as described in step 2 above.
3. To save the changes, select the ***Save*** button.

### Deleting a user defined library

1. Select the library name which you want to delete from the pull-down menu.
2. Press ***Delete***.
3. Press ***Save*** to save the changes.

### Creating a small list

A small list is a list of up to three comments attached to one comment location on the touch panel. You can use a small list to group similar comments, such as those indicating a probe location. For example, you can specify that a small list include the following comments: Long, Transverse, and Coronal. To make comments easier to use, you can define the small list in the same location in each comment library.

To define a small list:

1. Move the **Trackball** to the comment field on Page1 or Page2 where you want to create a small list, and press **Set**.
2. Move the **Trackball** to the first field in the *Small List* section, and press **Set**.
3. To enter comments in the fields in the Small List section, select the field and press **Set**, then do one of the following:
   - Type the comment
   - Select the comment in the Copy from Existing list, and press **Set** twice.

   You can enter up to three comments. When you enter an comment in the first field of the Small List section, the selected comment field on Page1 or Page2 changes to SMALL LIST.
4. To save the changes, select the ***Save*** button.

*NOTE: The small list can be displayed as a pop-up window or as a toggle field. The Small List Operation field on the Comment tab allows you to specify how it is displayed.*

## Comments Libraries/Comments Preset Menu

On the Comments tab, you specify text and pointer options.

Figure 16-32. Comment/Comments Preset Menu

Table 16-32: Text

| Preset Parameter | Description |
|---|---|
| Text Font Size | Specify the font size. The font size increases as the number increases. |
| Text color (Text1 and Text2) | Select the color for comment Text1 and Text2. |
| Text Boundary | Select Group Move or Word Wrapping. |
| Small List Operation | Select whether you want small list options to display in a pop-up window or by a toggle function. |
| Enable Type Over Mode | Select to type over existing comments. Position the cursor over the text to be changed, then start typing. |
| Reset Small List | Select to indicate that small lists should not be reset to the first item. |
| Automatically Set Text | If selected, the system sets the comment at the cursor position automatically when text entry is complete. |

Table 16-33: Arrow

| Preset Parameter | Description |
|---|---|
| Arrow Length | Select the default pointer length. |
| Arrow Size | Select the default pointer size. |
| Keep Arrow Angle | Keep the angle of arrow pointer head until next change. |

Table 16-34: General

| Preset Parameter | Description |
|---|---|
| Retain while entering or leaving timeline mode | If selected, the system keeps the comment(s) on the monitor display when you enter or leave timeline mode. |
| TextOverlay in Multiple Image | When selected, and you select the F8 key to hide or show comments, if you are in multiple image, the system hides the text in both images. When cleared, the system only hides the text for the active image. |
| TextOverlay sequence | You can specify to display Text1, Text2, or both. This allows you to have some comments that do not change during the exam while allowing you to change other comments. Toggle the F8 key to cycle through the 3 Text1/Text12 states. |
| Erase When the image is unfrozen | Deletes comments when you unfreeze the image. If you check this parameter, Text2 automatically erase when you unfreeze the image. |
| Erase When the probe or application is changed | Deletes annotations when you change the application or probe. |
| Replace Undo Rotary with B Focus Rotary | If selected, the Focal Zone Number and Postion can be adjusted using the Annotation touch panel. The Undo Rotary control changes to B Focus Rotary. |

After you change comment options, select ***Save*** to save the changes.

## Comments Libraries/Applications Preset Menu

The Comments Libraries/Applications tab is a link to the Applications preset menu. The Applications preset screen allows you to specify which libraries belong to an application. You also specify which is the default library that displays when you use comments.

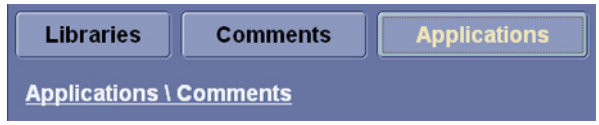



Figure 16-33. Applications/Comments Link

The Applications/Comments screen can be accessed through either the Comments Libraries or Applications touch panel key.

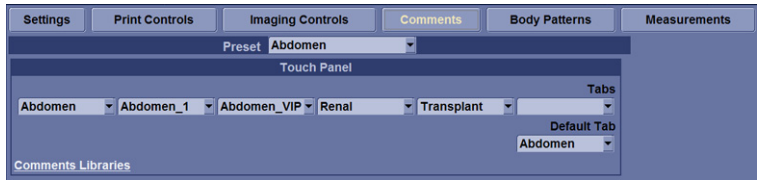



Figure 16-34. Applications/Comments Preset Menu

### Specifying which libraries belong to an application

1. On the Comments tab, in the Preset field, select the application.
2. In the Library Group Tabs fields, select the libraries for this application. You can select up to six libraries.
3. In the Default Library Group field, select the default library you want the system to display when you use comments.

*NOTE: When you use comments, the default library is displayed. To use other libraries for the application, press the tab for the library.*

4. To save the changes, select the ***Save*** button.

Table 16-35: Applications

| Preset Parameter | Description |
|---|---|
| Preset | The name of the application preset. |
| Tabs | A list of libraries for the application. You can select up to six libraries. |
| Default Tab | The default library that the system displays when you use comments. |

## Using comments from a library

To use comments, press the **Comment** key on the Control Panel. Comments are then displayed on the touch panel.

To select a comment library, press the appropriate tab (e.g. the tabs are OB23 and OB23_1).

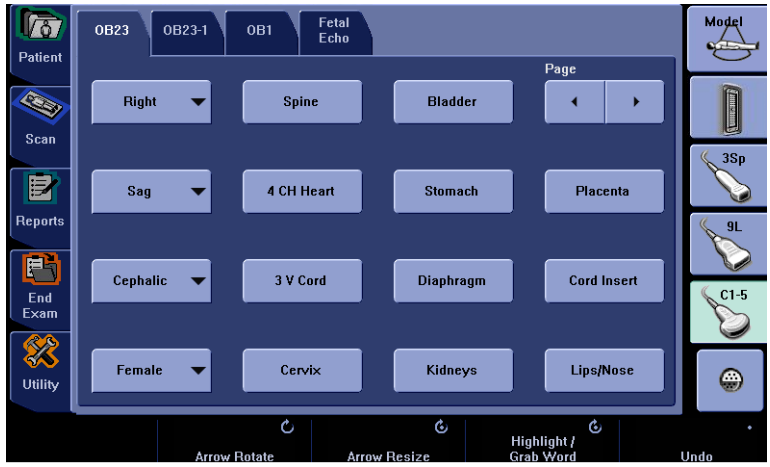



Figure 16-35. OB 2/3 Comments touch panel

# Body Patterns Presets

## Overview

Body patterns screens allow you to specify body pattern options, to define body pattern libraries, and assign body pattern libraries.

## Body Pattern Libraries/Libraries Preset Menu

On the Body Patterns Libraries tab, you can change and create body pattern libraries. A body pattern library is a list of body patterns that are associated with a specific application. The body patterns are listed in the library in the order in which they display on the touch panel. For each library, you can define two touch panel displays of body patterns (Page1 and Page2), with 15 body patterns on each touch panel.

## Body Pattern Libraries/Libraries Preset Menu (continued)

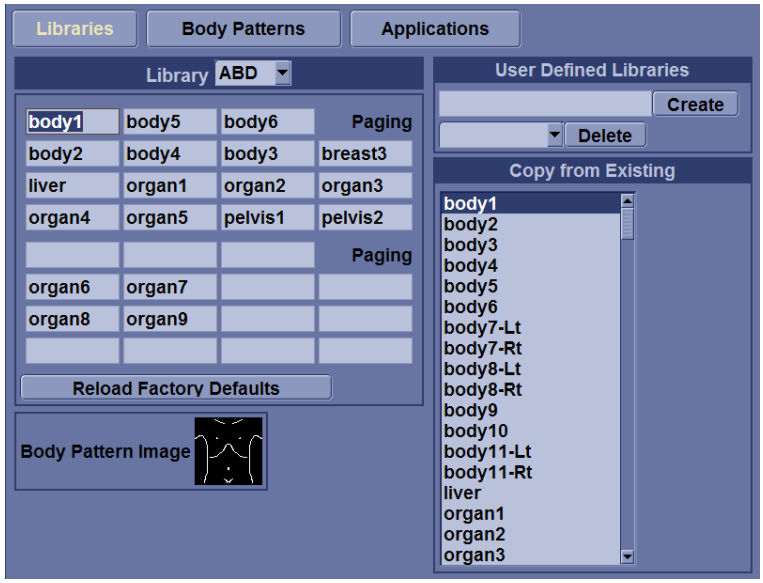



Figure 16-36. Body Patterns Libraries Preset Menu

Table 16-36: Body Patterns Libraries

| Preset Parameter | Description |
|---|---|
| Library | The name of the body pattern application library. |
| Paging | The first (or second) touch panel page of body patterns for the selected library. |
| Body Pattern Image | Displays the image of the currently selected body pattern. |
| User Defined Libraries-Create | The name of a new body pattern application library that you want to create. |
| User Defined Libraries-Delete | Allows the selection of the user defined library to be deleted. |
| Copy from Existing | A list of body patterns you can use to create an application library. |

### Defining body patterns

1. In the *Library* field, select the application library you want.

   The system displays all body patterns for the library. You can have two touch panel displays of body patterns for each library. The body patterns are listed in the order that they are shown on the touch panel.
2. To change or add a body pattern, select the body pattern or blank location and press **Set**, then do one of the following:
   - Type the body pattern name.
   - Select the body pattern in the *Copy from Existing* list, and press **Set**.

*NOTE: When you select a body pattern name in a touch panel location or in the Copy from Existing list, the system displays the pattern in the lower left corner of the screen.*

3. To save the changes, select the ***Save*** button.

### Creating a new body pattern library

1. In the *User Defined Libraries* field, type a name for the library, then select Create.

   The system creates a new library.
2. Enter body patterns as described in step 2 above.
3. To save the changes, select the ***Save*** button.

## Body Pattern Libraries/Body Patterns Preset Menu

On the Body Patterns tab, you specify body pattern options.

Figure 16-37. Body Patterns General Preset Menu

Table 16-37: Body Patterns

| Preset Parameter | Description |
|---|---|
| Erase When the probe or application is changed | If checked, when you change probes or applications, the system erases the body pattern. |
| Erase When the image is unfrozen | If checked, when you unfreeze the image, the system erases the body pattern. |
| Copy to active side in multiple image | If checked, when you use dual B-Mode, the system copies the body pattern to the active side of the dual image. |
| Body pattern background | Select whether you want the body pattern background to be Transparent or Opaque. |
| Use Zoom Rotary knob to select Body pattern | If selected, you can scroll through the body patterns with the Zoom control. |

After you change body pattern options, select Save to save the changes.

## Body Pattern Libraries/Applications Preset Menu

The Body Patterns Library/Applications tab is a link to the Applications preset menu. The Body Patterns Applications tab allows you to select body pattern application libraries. You also specify which is the default library that displays when you use body patterns.

Figure 16-38. Applications/Body Patterns Link

The Applications/Body Patterns screen can be accessed through either the Body Pattern Libraries or Applications touch panel keys.

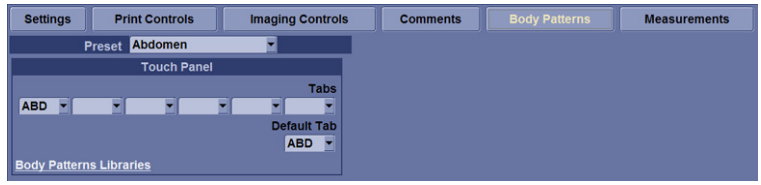



Figure 16-39. Body Patterns Applications Preset Menu

Table 16-38: Applications

| Preset Parameter | Description |
|---|---|
| Preset | Defines the Body Pattern option. |
| Tabs | A list of body pattern applications. |
| Default Tab | The default library that the system displays when you use body patterns. |

### Selecting body pattern application libraries

1. On the Body Patterns tab, in the Preset field, select the body pattern.
2. In the Library Group Tabs fields, select the application libraries for Body Patterns. You can select up to six libraries.
3. In the Default Library Group field, select the default application library you want the system to display when you use body patterns.

*NOTE: When you use body patterns, the default library is displayed. To use other application libraries, press the tab for the library.*

4. To save the changes, select the ***Save*** button.

## Using body pattern application libraries

See the following Body Patterns Small Parts touch panel.

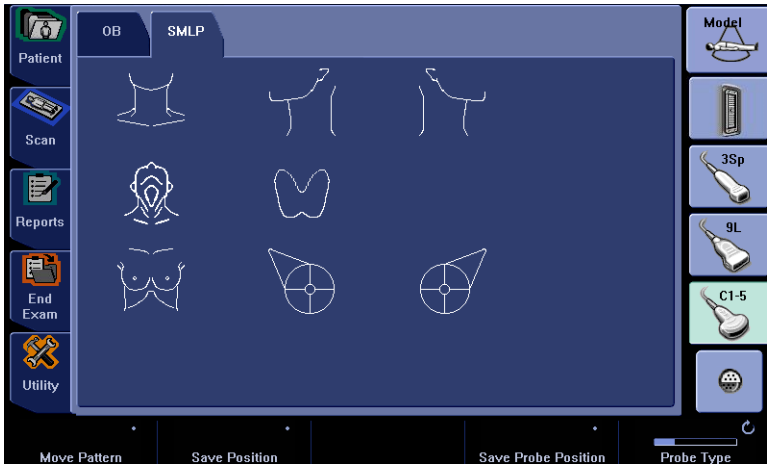



Figure 16-40. Body Pattern Small Parts touch panel

To select a body pattern library, select the tabs (for example, ABD or OB).

To select body patterns, use the **Ellipse/Body Pattern** control on the Control Panel.

# Application Presets

## Overview

Application Presets allow you to configure the application-specific settings (presets).

## Settings

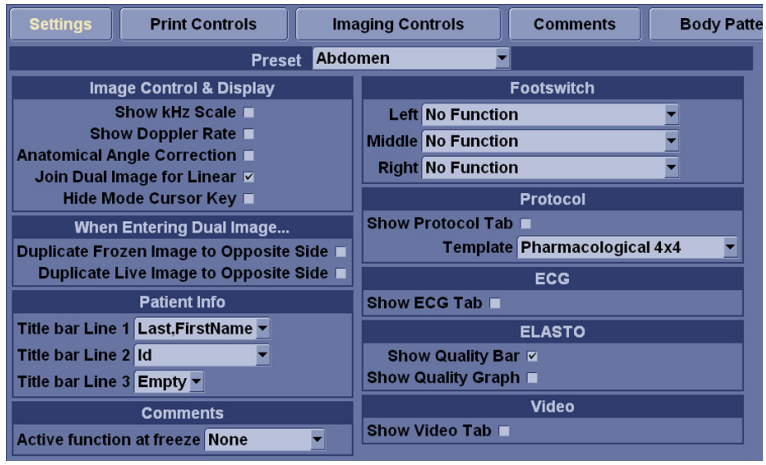



Figure 16-41. Application Settings Preset Menu

Table 16-39: Preset

| Preset Parameter | Description |
|---|---|
| Preset | Select the application that you want to specify the presets. Along with the various applications available on the system, there are four user-defined application presets that can be set. |

Table 16-40: Image Control and Display

| Preset Parameter | Description |
|---|---|
| Show kHz scale | When selected, displays the kHz scale on the left side of the Doppler spectrum. |
| Show Doppler Rate | When selected, displays the Doppler rate (mm/s) below the Doppler spectrum. |
| Anatomical Angle Correction | Select to keep the angle constant with regard to the anatomy. |
| Join Dual Image for Linear | Select to place linear probe dual images directly next to each other. |
| Hide Mode Cursor Key | Select to unmap (hide) the Mode Cursor key, which normally appears on the left Trackball key during live scanning in B-Mode or Color Flow Modes. |

Table 16-41: When Entering Dual Image...

| Preset Parameter | Description |
|---|---|
| Duplicate Frozen Image to Opposite Side | When entering Dual Image, duplicate the frozen image to the opposite side. |
| Duplicate Live Image to Opposite Side | When entering Dual Image, duplicate the live image to the opposite side. |

Table 16-42: Patient Info

| Preset Parameter | Description |
|---|---|
| Titlebar Line 1 | Select the patient information to display on the scanning screen Title bar. |
| Titlebar Line 2 | Select the patient information to display on the scanning screen Title bar. |
| Titlebar Line 3 | Select the patient information to display on the scanning screen Title bar. |

Table 16-43: Comments

| Preset Parameter | Description |
|---|---|
| Active function at Freeze | Select None, Body Pattern, or Comments. If Body Pattern or Comment is selected, the Body Pattern or Comment is activated automatically when freezing the system. |

Table 16-44: Footswitch

| Preset Parameter | Description |
|---|---|
| Left, Middle, Right | Specify from the following for each footswitch pedal: No Function, Record/Pause, Freeze, Next Heartcycle, Previous Heartcycle, Print 1,2,3,4, Update, Next Step (Scan Assistant), Previous Step (Scan Assistant), Scan Assistant Pause/ Resume, or Mark Cine. |

Table 16-45: Protocol

| Preset Parameter | Description |
|---|---|
| Show Protocol Tab | Check to display the Protocol Tab on the touch panel. |
| Template | Select the default stress echo template: Bicycle Normal, Bicycle Sporty, Contrast Pharmacological, Pharmacological 4x4, Pharmacological 8x5, Exercise 2x4, Exercise 2x4 B, Pharmacological US 4x4 |

Table 16-46: ECG

| Preset Parameter | Description |
|---|---|
| Show ECG Tab | Check to the ECG Tab on the touch panel. |

Table 16-47: ELASTO

| Preset Parameter | Description |
|---|---|
| Show Quality Bar | Check to display a Quality Bar for Elastography. The more bars, the better the quality. As the quality increases, the bars go from red, to yellow, to green. |

Table 16-47: ELASTO (Continued)

| Preset Parameter | Description |
|---|---|
| Show Quality Graph | Check to display a Quality Graph for Elastography. The higher the level, the higher the data quality for the frames. |

Table 16-48: Video

| Preset Parameter | Description |
|---|---|
| Show Video Tab | Check to display a Video tab on the touch panel. |

## Print Controls

You have to set parameters with each application.

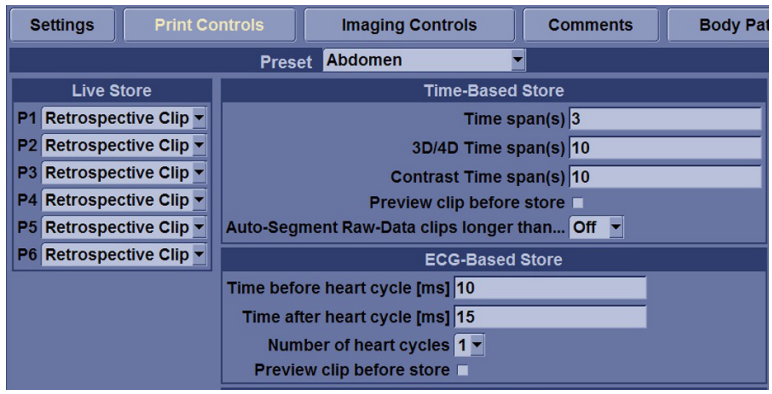



Figure 16-42. Print Control

Table 16-49: Preset

| Preset Parameter | Description |
|---|---|
| Preset | Select Application from pull-down menu. You can set Time span for each application. |

Table 16-50: Live Store

| Preset Parameter | Description |
|---|---|
| P1, P2, P3, P4, P5, P6 | Select the behavior of Print key during live scan from Prospective Clip, Reprospective Clip, Single image only or None for each print key.<br>None: Store a still image when you press P-key during Freeze.<br>Prospective clip: The system begins storing cine from when you press the Print button, based on the Time Span setting.<br>Reprospective clip: The system stores cine predetermined timebefore you press the Print button, based on the Time Span setting.<br>Single image only: Store a still image during live scan each time you press P-Key. |

Table 16-51: Time-Based Store

| Preset Parameter | Description |
|---|---|
| Time span [s] | Select the number of seconds of CINE Loop storage. The default is 3 seconds. |
| Contrast Time span [s] | Select the number of seconds of CINE Loop storage while in Contrast. |
| Preview loop before store | When selected, allows you to review cine loops before storage. |
| Auto Segment Raw data Clips Longer than... | When selected, the system divides cine automatically which take a longer time than Time span you have programmed. |
| 3D/4D Time span (noECG) [s] | Select the number of seconds of CINE Loop storage while in 3D/4D. |

Table 16-52: ECG-Based Store

| Preset Parameter | Description |
|---|---|
| Time before heart cycle [ms] | Sets the storage time span before R-wave of the first heart cycle. You can set the number of heart cycles in Application -> Setting -> Image Store. |
| Time after heart cycle [ms] | Sets the storage time span after R-wave of the last heart cycle. You can set the number of heart cycles in Application -> Setting -> Image Store. |
| Number of heart cycles | Select the number of heart cycles to store. (Must be de-selected for single frame.) |
| Preview loop before store | When selected, allows you to review cine loops before storage. |

Table 16-53: Mark Cine

| Preset Parameter | Description |
|---|---|
| Enable Mark Cine Control | Lets you mark where you want the CINE Loop to start (prospective CINE). |

Table 16-53: Mark Cine

| Preset Parameter | Description |
|---|---|
| Preview Loop Longer than...(s) | When selected, allows you to review cine loops before storage for loops longer than selected timeframe (in seconds). |

## Imaging Controls

You can select which controls you want to be available via the touch panel during a clinical scan. When you select Preset--> Application and Control Mode--> Clinical, deselect the controls you **DO NOT** want to appear while scanning in this clinical application.

*NOTE: If you select Research, all controls appear.*

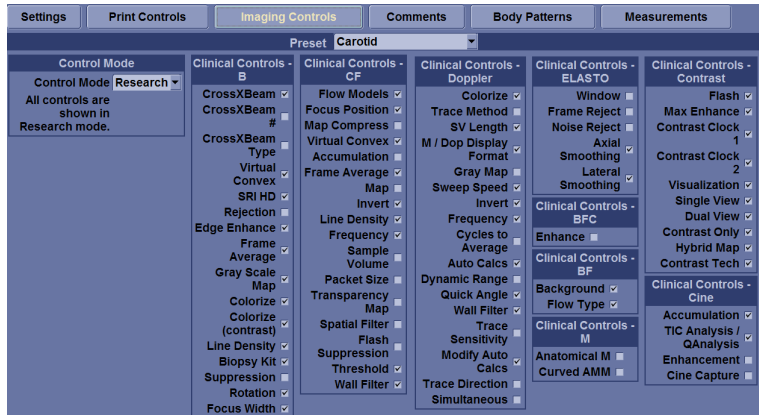



Figure 16-43. Imaging Controls

## Imaging Controls (continued)

Clinical vs Research touch panel Example

Figure 16-44. Clinical Control Mode - example

Figure 16-45. Research Control Mode -example

## Comments and Body Patterns

Comments and Body Patterns were described earlier in this chapter.

## Measurements

You can set the exam category measurement and calculation package you want to appear when you select the exam category Preset.

Figure 16-46. Application Measurements Menu

# Test Patterns

## Overview

There are different test patterns available: Gray Bars, Color Bars, Resolution, Text, Angularity, Brightness Calibration, White, Gray, Red, Green, Blue and Pixel test patterns.

## Pixel Test Patterns

Pixel patterns should appear to be a uniform color rectangle on the Blue/Yellow (B/Y and Y/B), Cyan/Red (C/R and R/C), Green/Magenta (G/M and M/G) and Black/White (K/W and W/K). If an area of the screen appears to have a dark or light grouping of pixels, first clean the screen to ensure that gel or dust is not causing an optical defect. If a pixel is defective, contact your Service Representative.

# Configuring Connectivity

## Overview

You use Connectivity functionality to set up the connection and communication protocols for the ultrasound system. The following page gives an overview of each of the Connectivity functions. Each function is described in detail in the following pages.

## Structured Reporting

DICOM Structured Reporting provides the results of a procedure as structured data elements (well-defined fields) as opposed to unstructured data (large amounts of text undifferentiated by individual fields). This greatly improves query capability. DICOM Structured Reporting creates coded clinical data that can be used for clinical research, outcomes analysis, and disease management.

DICOM Structured Reporting is a standardized format for medical results. LOGIQ S7 Expert/Pro supports the following templates:

- OB-GYN REPORT TEMPLATES
- VASCULAR ULTRASOUND REPORT TEMPLATES

  The system supports selectable vessels with their locations for B-Mode measurements.

  For Vascular studies (Bypass Graft, UEV Map, LEV Map, LEA/UEA, and Carotid), additional measurement locations were added. For instance, for a Bypass Graft, there are now measurements at Inflow, Anast, Thigh, Knee, Calf, Ankle, Graft, RunOff, Pre-Sent, Stent, Post-Stent, and Outflow locations.
- ECHOCARDIOGRAPHY PROCEDURE REPORT TEMPLATES

These templates do not support all M&A results for the LOGIQ S7 Expert/Pro.

### Supported parameters

The DICOM supported parameters are listed in the DICOM Conformance Statement at the following website under DICOM - Ultrasound:

http://www.gehealthcare.com/usen/interoperability/dicom/

## Connectivity Functions

To set up your institution's connectivity, you must login with administrator privileges.

1. **TCPIP**: allows you to configure the Internet Protocol.
2. **Device**. allows you to set up devices.
3. **Service**: allows you to configure a service (for example, DICOM services such as printers, worklist, and other services such as video print and standard print) from the list of supported services. This means that the user can configure a device with the DICOM service(s) that particular device supports.
4. **Dataflow**: allows you to adjust the settings of the selected dataflow and associated services. Selecting a dataflow customizes the ultrasound system to work according to the services associated with the selected dataflow.
5. **Button**: allows you to assign a pre-configured output service (or a set of output services) to the Print keys on the control panel.
6. **Removable Media**: enables formatting (DICOM, database, or blank formatting) and DICOM verification of removable media.
7. **Miscellaneous**: allows you to set up the patient exam menu options, print and store options, and the order of the columns in the examination list on the Patient menu.

Configure these screens from left to right, starting with the Tcpip tab first.

*NOTE: The ultrasound system is pre-configured for many services, with default settings selected. You can change these services and settings as needed.*

CAUTION

You must restart the LOGIQ S7 Expert/Pro (shutdown) after making any changes to connectivity settings in the Utility menus. This includes any changes on the TCPIP or dataflow setup screens.

## TCPIP

This configuration category enables users with administrative rights to set the TCPIP for the system and connected remote archive.

1. Type the name of the Ultrasound system in the Computer Name field.
2. In the IP settings section, identify the ultrasound system to the rest of the network by one of the following:
   - DO NOT enable DHCP.
   - Type the IP-Address (acquire unique static IP address from hospital network administrator), Subnet Mask, and Default Gateway (if applicable).

*NOTE: Do not set up the system with DHCP. The IP address MUST BE static for the diagnostic and DICOM to function correctly.*

3. Select Save settings.
4. Re-boot the ultrasound system.

*NOTE: TCPIP settings do not get restored when restoring backups. This is per system design. The LOGIQ S7 Expert/Pro IP address MUST BE unique.*

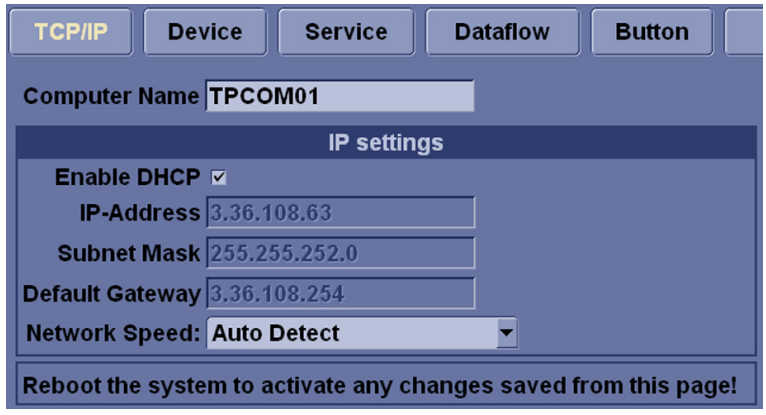



Figure 16-47. Connectivity TCPIP Preset Menu

Table 16-54: Computer Name

| Preset Parameter | Description |
|---|---|
| Computer Name | Type the unique name for the Ultrasound system (no spaces in name). |

Table 16-55: IP settings

| Preset Parameter | Description |
|---|---|
| Enable DHCP | DO NOT select this box to enable dynamic IP Address selection. NOTE: The system shall disable IP-Address, Subnet Mask, and Default Gateway when the user chooses to use DHCP. |
| IP-Address | Type the IP Address of the Ultrasound system. NOTE: IP stands for Internet Protocol. Every device on the network has a unique IP address. |
| Subnet Mask | Type the subnet mask address. NOTE: The Subnet Mask is an IP address filter that eliminates communication/messages from network devices of no interest to your system. |
| Default Gateway | Type the default gateway address. |
| Network Speed | Select the network speed (Auto Detect, 10Mbps/Half/Full Duplex, 100Mbps/Half/Full Duplex, or 1000Mbps/ Auto-negotiate). |

*NOTE: Reboot the system to activate any changes saved from this page.*

## Device

To add a new device,

1. Press ***Add***.
2. Type the device name in the Name field.
3. Type the device's IP address in the IP Address field.

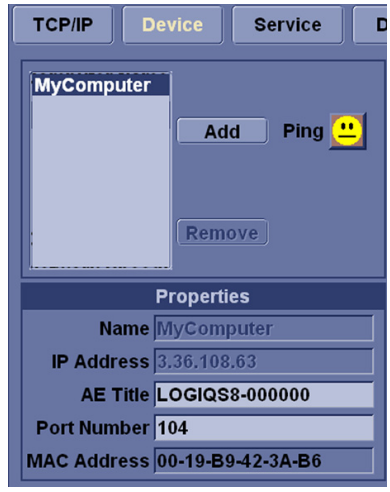



Figure 16-48. Connectivity Device Preset Menu

Table 16-56: Device

| Preset Parameter | Description |
|---|---|
| Add/Remove | Press Add to add a new device; press Remove to delete a device. |
| Ping | Press Ping to confirm that a device is connected. |
| Properties: Name | Type the name of the device. |
| Properties: IP Address | Type the device's IP address. |
| Properties: AE Title | AE Title of the LOGIQ S7 Expert/Pro. NOTE: Only available for MyComputer. |
| Properties: Port Number | IP Port Number Used for DICOM, set by default to 104. NOTE: Only available for MyComputer. |
| Properties: MAC Address | Unique network card address. NOTE: Only available for MyComputer. |

## Device (continued)

To ping a device,

1. Select the device.
2. Press ***Ping***. If the smiley face smiles, then the connection has been confirmed. If the smiley face frowns, then the connection has not been made. Check the device name and IP address.

## Service

For each Device that you added to the system, you need to set up the service(s) that device supports (you must be an administrator to update these screens).

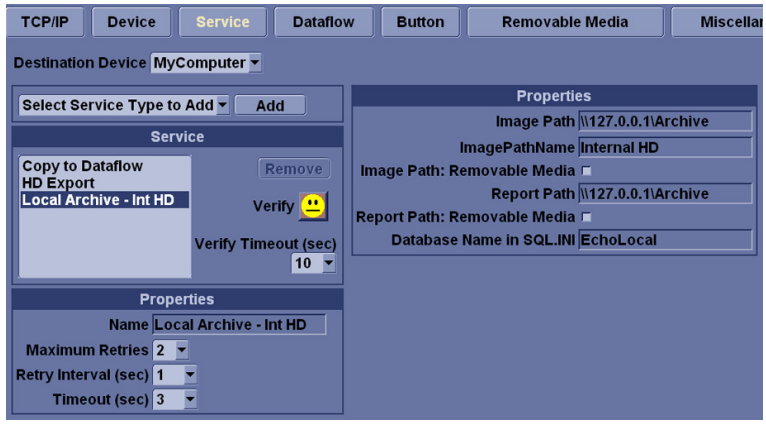



Figure 16-49. Connectivity Services Preset Menu, My Computer

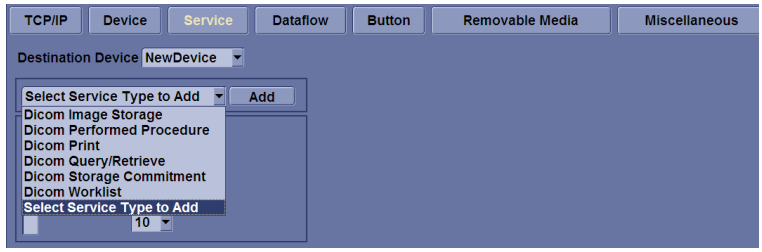



Figure 16-50. Connectivity Services Preset Menu, New Device

The Services screen has the following sections of information:

1. **Destination Device** - lists information about destination devices. You can select from a list of currently existing devices.
2. **Service Type to Add** - lists information about services for the destination device. You can add services, select from a list of currently existing services, and remove services.
3. **Service Parameters** - lists properties for the service currently selected in the Services section. The name and parameters in this section change, depending on what service is currently selected. In the above figture, this section shows DICOM Print parameters.

### Adding a service to a destination device

1. Select the service from the pull-down menu. Press ***Add***.
2. Specify the properties for this service. Press ***Save***.
3. Verify the service.

### Removing a service

1. Select the service. Press ***Remove***.
2. Press ***Save***.

### Changing parameters for a service

There are certain parameters that may need to be set up for each service:

Table 16-57: Service Parameters: Common Service Parameters

| Preset Parameter | Description |
|---|---|
| Name | Free text: give a descriptive name to the device. |
| AE Title | The Application Entity Title for the service. |
| Port Number | The port number of the service. |
| Maximum Retries | Max # – the maximum number of times to try establishing a connection to the service. |
| Retry Interval (sec) | Specify how often (in seconds) the system should try to establish a connection to the service. |
| Timeout | The amount of time after which the system will stop trying to establish a connection to the service. |

## Changing parameters for a service (continued)

Many service parameters are specific to each type of service. The parameters are described on the following pages:

- DICOM Image Storage
- DICOM Performed Procedure
- DICOM Print
- DICOM Query/Retrieve
- DICOM Storage Commitment
- DICOM Worklist
- Standard Print
- Video Capture
- Save As
- Network storage
- USB Quick Save

## DICOM Image Storage

DICOM Image Storage allows the system to send or receive ultrasound images in a format that can be interpreted by PACS.

CAUTION

GE Healthcare does not warrant the operation if the DICOM format of send image (US, USMF, SC) does not correspond with the DICOM Server.

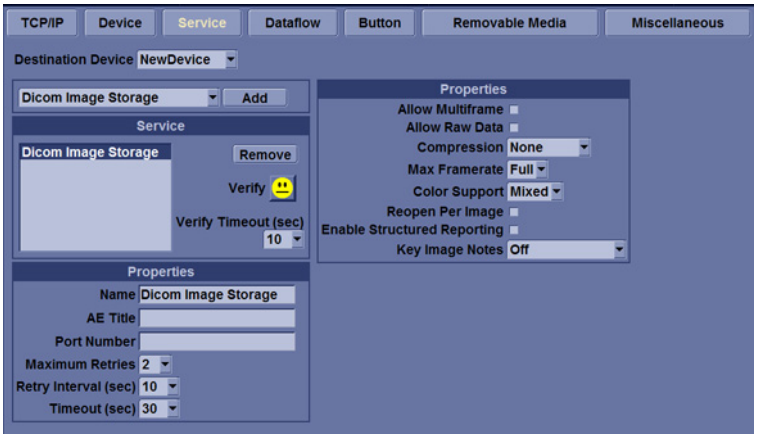



Figure 16-51. DICOM Image Storage Service

Table 16-58: DICOM Image Storage

| Preset Parameter | Description |
|---|---|
| Allow Multiframe | Select to allow cine loop storage. |
| Allow raw data | Select to save data in both TruAccess (raw data) and DICOM format. Clear to save in DICOM format only. |
| Compression | Select the compression type: None, Rle or Jpeg. |
| Max Framerate | Select the maximum frame rate: Full, 25, or 30. |
| Color Support | Select: Mixed, Gray or Color |
| Reopen per image | Reopen per image |
| Enable Structured Reporting | Select for Structured Reporting. |

Table 16-58: DICOM Image Storage (Continued)

| Preset Parameter | Description |
|---|---|
| Key Image Notes | Image deletion notification. ONLY available for the Direct Store Workflow and ONLY generated when there are images deleted during the exam. Selecting this lets the reader at the PACS system know which images have been deleted. An indicator is placed on deleted images with a reason, “Rejected for Quality Reasons,” for example. |

## DICOM Performed Procedure

DICOM Performed Procedure provides an acknowledgement that a study has been performed.

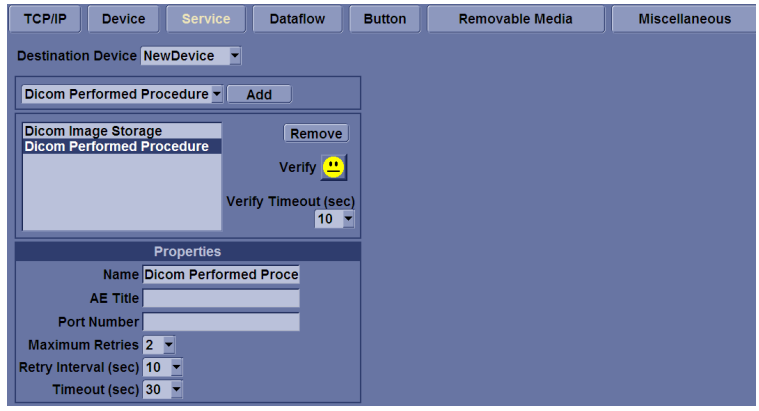



Figure 16-52. DICOM Performed Procedure Service

## DICOM Print

DICOM Print provides the ability to send or receive ultrasound image data to DICOM printers.

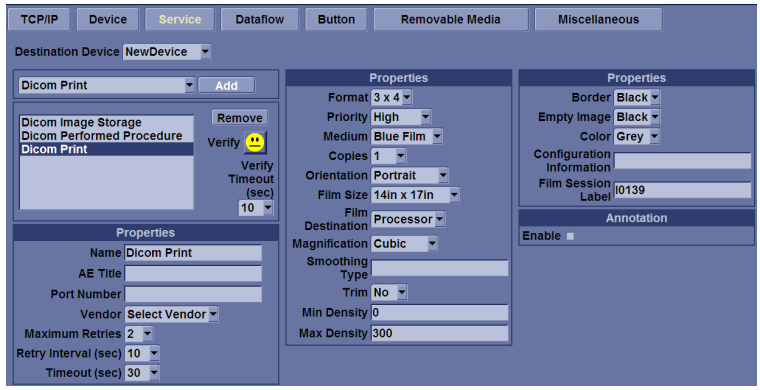



Figure 16-53. DICOM Print Service

Table 16-59: Properties

| Preset Parameter | Description |
|---|---|
| Vendor | Specify PACS Vendor. This enables annotation on patient information since by definition patient information is missing on the title bar. |
| Format | Indicates how many prints to print per page, for example, 1,1, 1,2, 1,3, up to 7,5. Partial prints are displayed as one print job. |
| Priority | Specify the print job priority: High, Medium, or Low. |
| Medium | Select the print medium: Clear Film, Paper, or Blue Film. |
| Copies | Enter the number of copies. |
| Orientation | Specify whether to print the image Portrait (vertically) or Landscape (horizontally). |
| Film Size | Specify the dimensions of the film size. |
| Film Destination | Specify the film destination for the exposed film<br>• Magazine – Store in a film magazine<br>• Processor – Develop in a film processor |

Table 16-59: Properties (Continued)

| Preset Parameter | Description |
|---|---|
| Magnification | Specify how the printer magnifies the image to fit it onto the film.<br>• Replicate – Interpolated pixel are copies of the adjacent pixels<br>• Bilinear – Interpolated pixels are created by bilinear interpolations between the adjacent pixels<br>• Cubic – Interpolated pixels are created by cubic interpolations between the adjacent pixels<br>• None – No interpolation |
| Smoothing Type | Specify the printer's magnification interpolation for the output. |
| Trim | Specify whether you want a trim box to be printed around each image on the film: Yes or No. |
| Min Density | Enter a number indicating the minimum density level of the film. |
| Max Density | Enter a number indicating the maximum density level of the film. |
| Border | Select to have the border area surrounding and between the images of the film: Black or White. |
| Empty Image | Select to have a Black or White empty image. |
| Color | Select whether to have the image Color or Grey. |
| Configuration Information | Enter vendor-specific image quality settings. |
| Film Session Label | Type a name for the group of film labels associated with the print job. |

Table 16-60: Annotation

| Preset Parameter | Description |
|---|---|
| Enable | Lets you annotate the image. |

## DICOM Query/Retrieve

DICOM Query/Retrieve provides a list of patients sorted by query parameters.

*NOTE: Some PACS vendors only offer Query/Retrieve as an option. Please confirm that this service is available.*

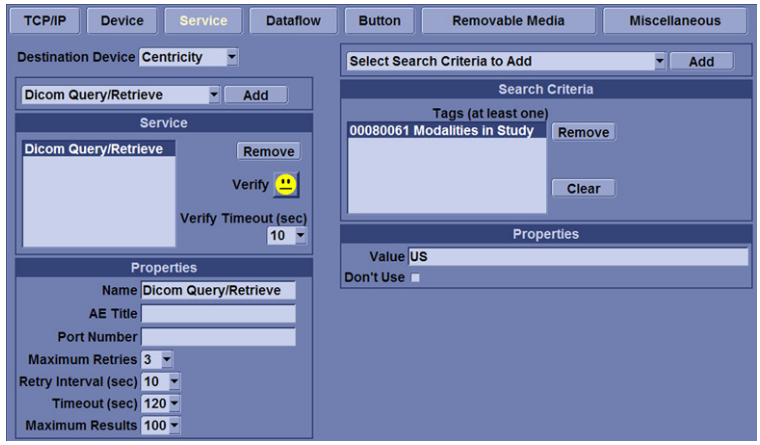



Figure 16-54. DICOM Query/Retrieve Service

Table 16-61: DICOM Query/Retrieve

| Preset Parameter | Description |
|---|---|
| Maximum Results | Specify the maximum number of patient records you want the system to retrieve when searching the patient database. |
| Search Criteria | Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database. |

*NOTE: If you are experiencing problems with slow responses from DICOM servers, increase the time-out in the DICOM server properties dialog. (Utility -> Connectivity -> Service -> Properties -> Maximum Retries and Timeout). Problems with slow responses may result in images being re-sent automatically and low transfer rates. The retry settings can be used to make jobs retry on bad networks. When portable (off-line), use minimum time-out and no retries or it will affect shutdown speed.*

Table 16-62: DICOM Query/Retrieve Search Criteria

| Preset Parameter | Description |
|---|---|
| Select Search Criteria to Add | Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time. |
| Tags (at least one) | The name of a tag selected to use for search criteria. |
| Properties: Value | Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field. |
| Properties: Don't Use | Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List. |
| Add | Select to add the tag and value to the list of search criteria. |
| Remove | Select to remove the tag and value from the list of search criteria. |
| Clear | Clears all tags. |

### Query/Retrieve Per Series

You can now display/retrieve multiple series by patient on the Patient--> Data Transfer--> Q/R page.

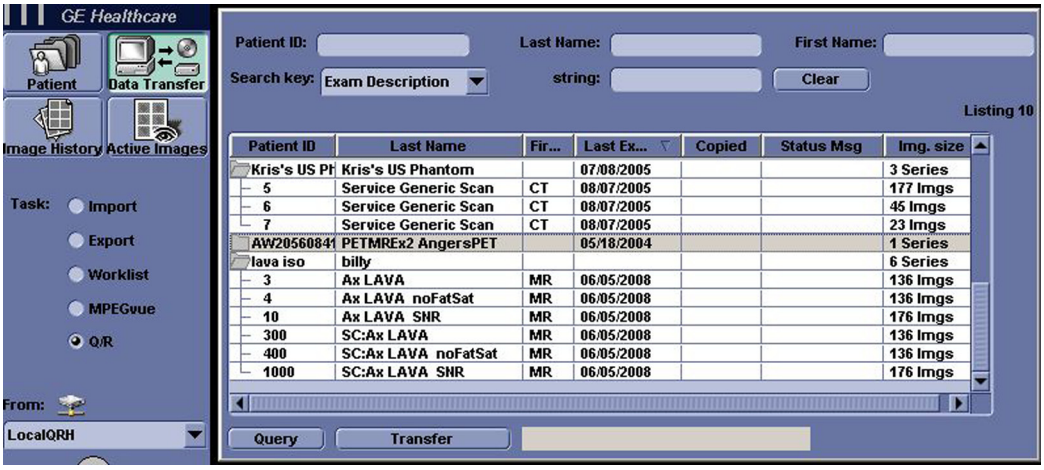



Figure 16-55. Q/R Per Series Example

## DICOM Storage Commitment

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.

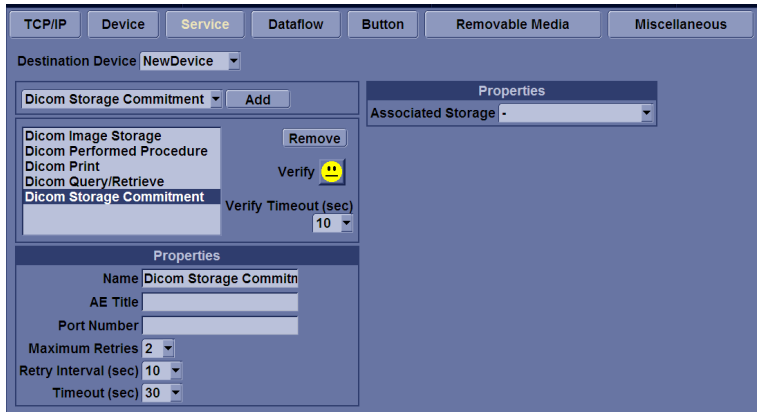



Figure 16-56. DICOM Storage Commitment Service

Table 16-63: DICOM Storage Commitment

| Preset Parameter | Description |
|---|---|
| Associated Storage | This selection is based on the services entered by the user. |

## DICOM Worklist

DICOM Worklist provides a list of patients sorted by query parameters.

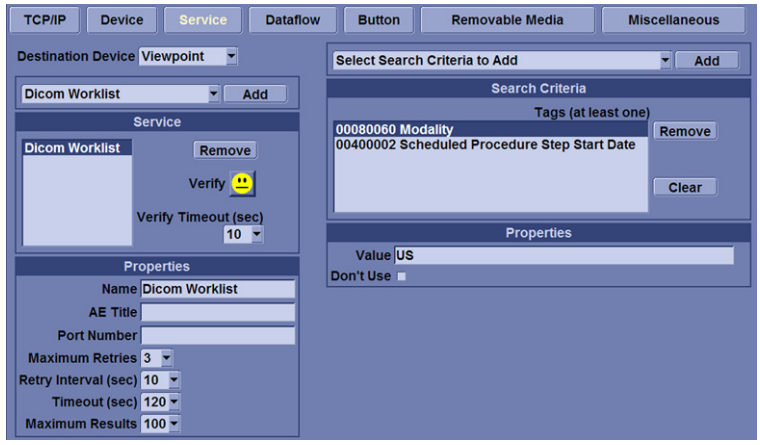



Figure 16-57. DICOM Worklist Service

Table 16-64: DICOM Worklist

| Preset Parameter | Description |
|---|---|
| Max. Result | Specify the maximum number of patient records you want the system to retrieve when searching the patient database. |
| Search Criteria | Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database. |

Table 16-65: DICOM Worklist Search Criteria

| Preset Parameter | Description |
|---|---|
| Select Search Criteria to Add | Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time. |
| Tags (at least one) | The name of a tag selected to use for search criteria. |
| Properties: Value | Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field. |

Table 16-65: DICOM Worklist Search Criteria

| Preset Parameter | Description |
|---|---|
| Properties: Don't Use | Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List. |
| Add | Select to add the tag and value to the list of search criteria. |
| Remove | Select to remove the tag and value from the list of search criteria. |
| Clear | Clears all tags. |

## Standard Print

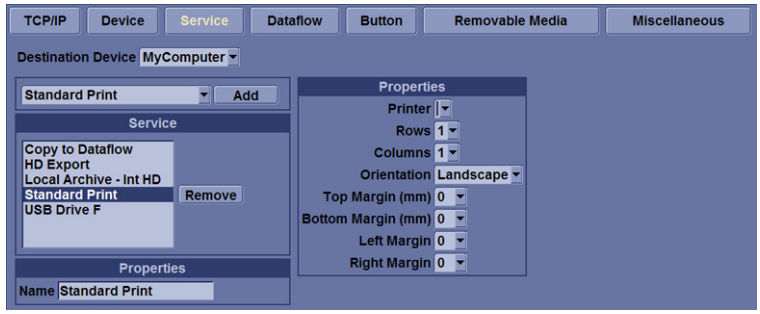



Figure 16-58. Standard Print Service

Table 16-66: Standard Print

| Preset Parameter | Description |
|---|---|
| Printer | Select the printer. |
| Rows | Specify 1-5. |
| Columns | Specify 1-5. |
| Orientation | Specify Landscape/Portrait |
| Top Margin (mm) | Specify the top margin (0-51mm) |
| Bottom Margin (mm) | Specify the bottom margin (0-51mm) |
| Left Margin | Specify the left margin (0-51mm) |
| Right Margin | Specify the right margin (0-51mm) |

## Video Capture

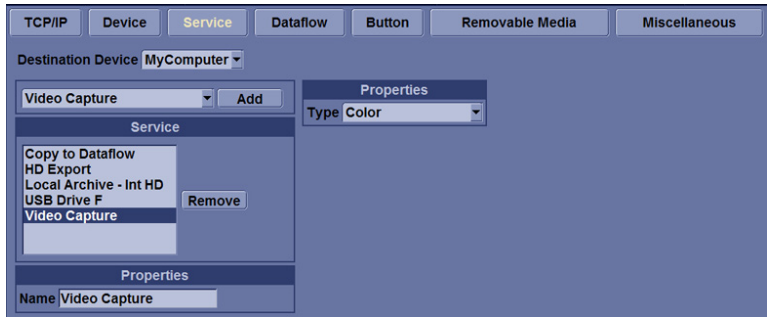



Figure 16-59. Video Capture Service

Table 16-67: Video Capture

| Preset Parameter | Description |
|---|---|
| Type | Specify Color, BW, or DVD Record/Pause. |

### Save As

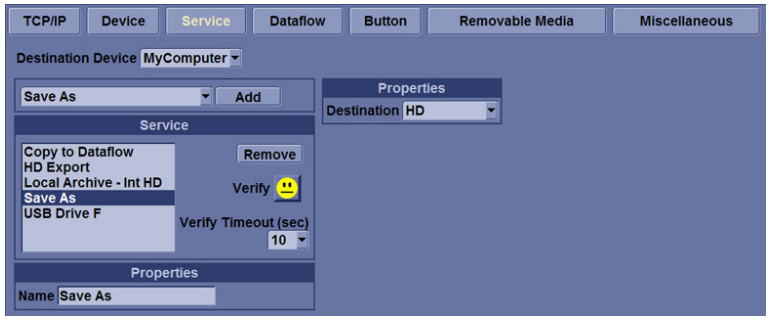



Figure 16-60. Save As

Table 16-68: Save As

| Preset Parameter | Description |
|---|---|
| Destination | Specify destination device, Hard Drive, USB Flash Drive. |

### USB Quick Save

USB Quick Save provides the ability to easily send images to a USB memory stick or Network Storage. See ‘USB Quick Save’ on page 15-47 for more information.

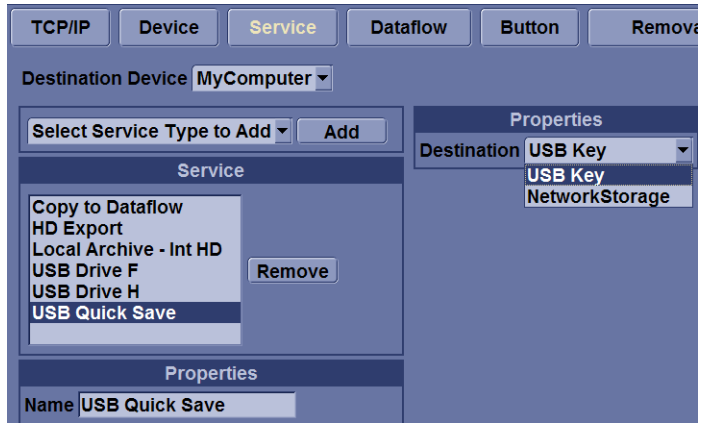



Figure 16-61. USB Quick Save

## Setting up a Printer

Use Standard Print for digital peripherals. These are printers with either a USB interface or Ethernet interface (Sony UP-D25MD, for example).

On the Utility --> Connectivity --> Button page, select the Print key in the upper, left-hand corner of the display. In the middle portion of the page, under Available Input/Outputs, select the printer you want to configure. Next, press the two right arrows (>>) in the upper, right-hand corner of the page to move this printer into the Printflow View.

You can also configure the Standard Print button that appears on the Active Images screen.

Example: For instance a video capture device, on the Utility --> Connectivity --> Service page, in the Service Type to Add box, and press Add. In the properties box on the upper, right-hand side, select the type of device and in the Properties box in the lower, left-hand side, type in a unique descriptive name for this device.

## Dataflow

CAUTION

DO NOT rename the factory default dataflow.

A dataflow is a set of pre-configured services. When you select a dataflow, the ultrasound system automatically works according to the services associated with the dataflow. The Dataflow tab allows you to select and review information about dataflows. You can also create, change, and remove dataflows.

Set up dataflows for the services.

*NOTE: You must be logged on as Administrator to use the Dataflow tab.*

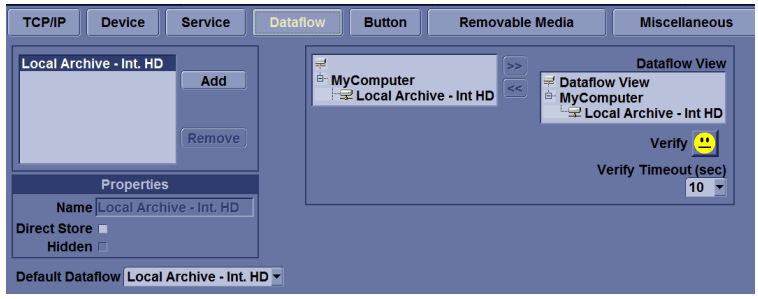



Figure 16-62. Dataflow Preset Menu

Table 16-69: Dataflow

| Preset Parameter | Description |
|---|---|
| Name | Select the dataflow from the list. |
| Direct Store | Select to store data directly to archive (no buffer storage). |
| Hidden | Select so that this dataflow does not appear as a Dataflow on the Patient menu. |
| Default Dataflow | Select to use this dataflow as the default dataflow when you start the system. |

**Key Object Selection: Image Deletion Notification**

Image Deletion Notification is available ONLY for the Direct Store Workflow and only generated when there are images deleted during the exam. This lets the reader at the PACS system know which images have been deleted. An indicator is placed on deleted images with a reason, “Rejected for Quality Reasons,” for example.

## Button

You can assign print buttons via the Utility --> Connectivity --> Button page.

Assigning print buttons. First select the print button to configure on the upper, left corner of the page. Then select the device you want to add in the middle part of the page, under Available Input/ Outputs. Then click on the right arrow in the top right corner of the page.

*NOTE: You can configure each print key to multiple output devices/ dataflows.*

*NOTE: Only attach one DICOM service per print key (e.g., PACS and DICOM printer). Multiple DICOM devices should be configured via a dataflow.*

*NOTE: When using a print key to send an image directly to a DICOM device, this causes a single DICOM association per image. Most devices (all known printers) work fine with this. However, some storage devices, such as ALI, Kodak Access, and Cemax, assume that the end of each association is the end of the exam and can result in a new folder for each image. In the Utility menu, select a single association or open PR for the desired DICOM storage device.*

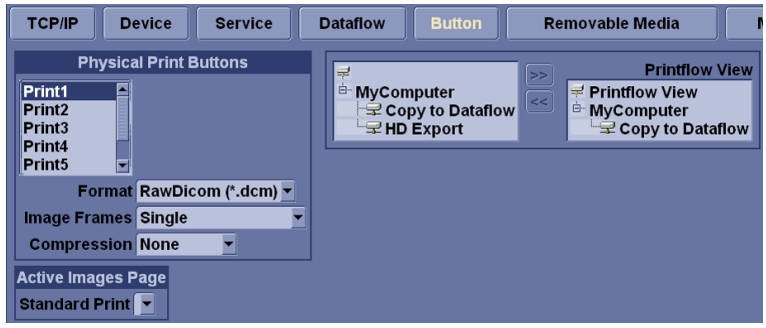



Figure 16-63. Button Preset Menu

Table 16-70: Button

| Preset Parameter | Description |
|---|---|
| Format | RawDICOM, DICOM, or M&A. |
| Image Frames | Single (captures a DICOM single frame image), Multiple (captures a DICOM multiframe, CINE) -- only select this if the PACS supports multiframe, and Secondary Capture (forces all DICOM images to Secondary Capture). |

Table 16-70: Button (Continued)

| Preset Parameter | Description |
|---|---|
| Capture Area | For use with Secondary Capture: Video Area, Image Area or Whole Screen. |
| Compression | Select the compression type: None, Rle, Jpeg, or Jpeg2000. |
| Standard Print | Lets you send to a Windows-based printer. |
| Single Association | Only visible with DICOM image storage destinations. When selected, the spooler sends multiple images in one store job. |

## Removable Media

The Removable Media tab allows you to:

- Verify the DICOM directory on removable media.
- Verify the free space of the media.
- Verify that the media is finalized or unfinalized.
- Verify that the media is formatted or unformatted.
- Format removable media (rewritable CD/DVD or USB device).

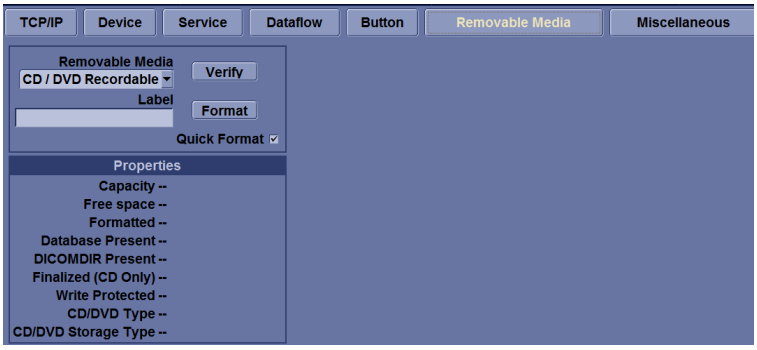



Figure 16-64. Removable Media Preset Menu

Table 16-71: Tools

| Preset Parameter | Description |
|---|---|
| Removable Media | Select the removable media to format or verify. |
| Label | Type a label for a new removable media (free text). |
| Verify | • Select to verify DICOM directory on removable DICOM disk.<br>• Verify the free space of the media.<br>• Verify that the media is finalized or unfinalized.<br>• Verify that the media is formatted or unformatted. |
| Format | Select to format removable media. |
| Quick Format | To format the media quickly, check this box. If you uncheck this box, the media is formatted with a full format. New media should always be formatted with a full format. |

The bottom of the screen lists properties of the selected media.

### Formatting removable media

1. Select the removable media from the Media list.
2. Type a name for the removable media in the Label field.

*NOTE:* *Do not use the following characters for labelling:*

\ / : ; . , * < > | + = [ ]

3. Select ***Format***. Confirm **OK** or **Cancel**.
4. An information window confirms when the format has been completed. Select **OK** to exit.

### Verifying removable media

1. Select the removable media from the Media list.
2. Select ***Verify***.

## Miscellaneous

The Miscellaneous tab allows you to configure tools related to patient management and print and store options. You can specify default system functionality, such as whether patient ID is required when you archive data, or if you want the system to automatically search the archive for a patient when you enter patient data.

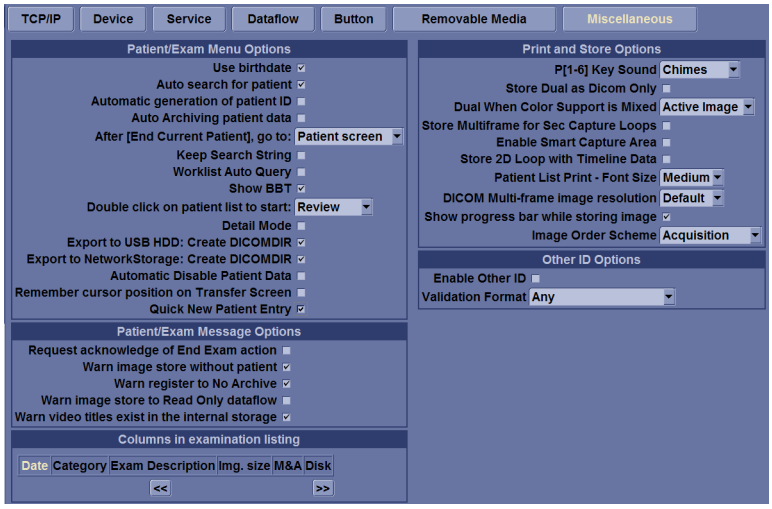



Figure 16-65. Miscellaneous Preset Menu

Table 16-72: Patient/Exam Menu Options

| Preset Parameter | Description |
|---|---|
| Use birthdate | In the Patient information window, enter either the patient age or the birth date:When selected, enter birth date, then the age is calculated.When cleared, enter age (birth date field not available). |
| Auto search for patient | In the Search/Create Patient window:When selected, the system automatically searches through the selected patient archive, while the user enters patient information.When cleared, the automatic search tool is turned off. If you are trying to keep the past patient data confidential, DO NOT use this feature. |
| Automatic generation of patient ID | In the Search/Create Patient window:When selected, the Patient ID is not required when entering a new patient in the archive. The system automatically generates an ID number.When cleared, the Patient ID is required when entering a new patient in the archive. |

Table 16-72: Patient/Exam Menu Options (Continued)

| Preset Parameter | Description |
|---|---|
| Auto Archiving patient data | Archives patient data automatically. |
| After [End Current Patient], go to: | Select Worklist screen or Patient screen. |
| Keep Search String | Search string is kept rather than cleared. |
| Worklist Auto Query | Automatically queries the worklist server. |
| Show BBT | Show BBT field on the OB patient screen to input the basal body temperature. |
| Double Click on Patient List to Start | Select Review or New Exam to display each time you double click on the patient name in the patient list on the Patient menu. |
| Detail Mode | Select to display Detail Mode, rather than Exam View, when you select the patient name in the patient list on the Patient menu. You can also type comments while in Detail Mode. |
| Export to USB HDD: Create DICOMDIR | Create DICOMDIR is a DICOM file format which contains how the directory and DICOM files structured for diagnostic portable media behave. It is important for portability between the LOGIQ S7 Expert/Pro to PACS. If you want to save exams to the USB Hard drive and look at it on the PACS, the DICOMDIR is a must. |
| Export to Network storage HDD: Create DICOMDIR | |
| Automatic Disable Patient Data | Select to automatically disable patient data.<br>If selected, locks the patient name, date of birth and gender (like Patient ID). The Factory Default for this preset is unchecked. |
| Remember Cursor Position on the Transfer Screen | To set a default cursor location on the Data Transfer screen:<br>1. Select the “Remember cursor position in the Transfer screen” preset and press Save.<br>2. On the Data Transfer screen, move the cursor to the desired field.<br>3. Exit out of the Data Transfer screen. When returning to the Data Transfer screen, the cursor location is in the position your selected. |
| Quick New Patient Entry | Select to store new patient automatically by pressing the Patient key. |

Table 16-73: Patient/Exam Message Options

| Preset Parameter | Description |
|---|---|
| Request acknowledge of End Exam action | When selected, the user is asked to confirm action when ending an examination. |
| Warn Image Store without Patient | Select to receive a warning when you press the Print key without an active patient. |
| Warn Register to No Archive | Select to receive a warning when you register a patient to the “No Archive” data flow. Select a different data flow for permanent storage of patient data. |
| Warn image store to Read Only dataflow | The system posts a warning message if you attempt to store images to a read-only Dataflow. |
| Warn video titles exist in the internal storage | The system posts a warning if the video titles exist on the internal DVR flash memory. |

Table 16-74: Print and Store Options

| Preset Parameter | Description |
|---|---|
| P[1-6] Key Sound | Select None, Click, Chimes, Ding, Ding-Dong, or Whoosh. |
| Store Dual as Dicom Only | Select to always store dual images as a DICOM (secondary capture) store, rather than Raw DICOM. |
| Dual When Color Support is Mixed | Dataflow Mixed is not available. While transferring dual images to the PACS, send black and white images as gray; send color images as color. Set up 2 services (one gray and one color), set up 2 dataflows, and set up 2 buttons. Each button needs to be tied to a different service.<br>Select if you want to keep the user preset for Color Photometric Interpretation while in Dual mode. |
| Store Multiframe for Sec Capture Loops | Select if you want the CINE loop stored as secondary capture. |
| Enable Smart Capture Area | Check box to select. |
| Store 2D Loop with Timeline Data | Check box to select. |
| Patient List Print-Font Size | Select font size. |

Table 16-74: Print and Store Options

| Preset Parameter | Description |
|---|---|
| DICOM Multi-Frame image resolution | Select Default, Medium, or Large for recalled DICOM Multi-frame Frame Cine loops. |
| Show progress bar while storing image | Show and hide the progress bar while image store on the scan screen.<br>When “Show progress bar” is On (default), the progress bar is shown while storing images when 1 sec is passed since starting image store and completed frames is less than 50% of total frames.<br>When “Show progress bar” is Off (uncheck the box), No progress bar is shown while storing images. Instead system shows status of image store on status bar while system is storing image.<br>Affect the following print flow service and function;<br>Copy to Dataflow, DICOM Image Storage, DICOM Print, HD Export, SaveAs (Raw DICOM or DICOM is selected as format)<br>SaveAs from SaveAs dialogue other than Avi format. |
| Image Order Scheme | Select to Direct Store images in Acquisition Order, Scan Assistant Order, or Off.<br>• **Off**. The clipboard on the Ultrasound system shows the image in the order it was acquired. Therefore, re-stored images appear where you’d expect. However, on the PACS system, images appear in arrival order or in image number order.<br>• **Acquisition Order**. From the Ultrasound system perspective, the same as “Off.” But on the PACS system (if based on image number order), images are displayed consistently with the way they are stored on the Ultrasound system.<br>• **Scan Assistant Order**. You can define the storage order (reading order) via Scan Assistant Creator. Therefore, based on the order defined in Scan Assistant, images are re-ordered and displayed in this manner both on the Clipboard and on the PACS system. |

Table 16-75: Other ID Options

| Preset Parameter | Description |
|---|---|
| Enable Other ID | Not selected is the Default.<br>If selected, allow entering Other ID, such as Citizen Service Number, Burger Service Number (BSN), National Health System (NHS) number, along with patient ID information on the Patient Screen. |
| Validation Format | If the Enable Other ID preset is selected, the system validates the format of “Other ID” when an ID is entered. Choose: NHS Number *** ** *****, Letters and Numbers, Numbers, or Any (no restriction) |

# System Administration

## Overview

The Admin screen has the following three sections:

- **System Administration** – lists all the options implemented in the system.
- **Users** – allows you to define user IDs, specify operator's registration, operator's rights, and registration of staff related to an examination (for example, referral doctors and sonographers).
- **Logon** – defines logon procedures.

## System Admin

The System Admin screen has information about any options implemented for the system.

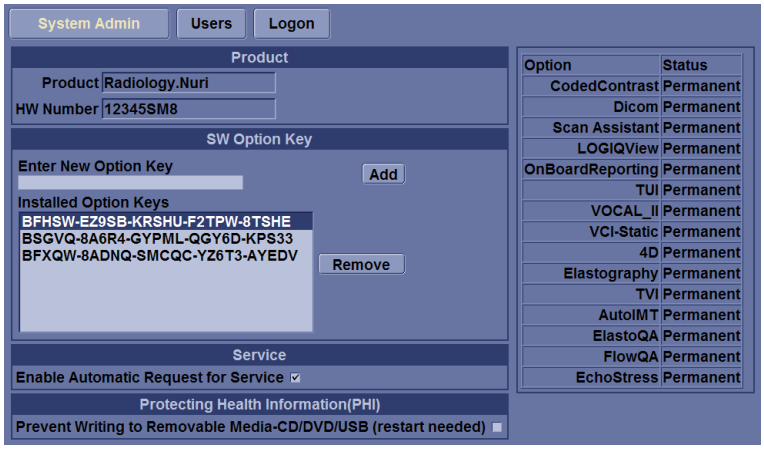



Figure 16-66. Administrative System Admin Preset Menu

Table 16-76: System Administration

| Preset Parameter | Description |
|---|---|
| Product | The name of the product. |
| HW Number | The hardware number of the product. |
| SW Option Key | The software option key section. |
| Enter New Option Key | Type the key for the option you wish to add and press Add. |
| Installed Option Keys | Lists the key for the installed options. |
| Remove | To remove a software option key, select the key in the SW Option Key list, and then select Remove. |
| Options | A list of the option name and status. |
| Status | Lists each option's effectivity. |

Table 16-77: Service

| Preset Parameter | Description |
|---|---|
| Enable Automatic Request for Service | Check this box to enable the system to send system-generated requests for service, without your intervention. |

Table 16-78: Protecting Health Information (PHI)

| Preset Parameter | Description |
|---|---|
| Prevent Writing to Removable Media-CD/DVD/USB (requires reboot) | Prevent from copying data including Patient Information to external storage device.<br>Media: USB Memory / USB HDD / CD-R / DVD-R<br>Function: Export / MPEGVue / EzBackup / EzMove / Save As / Save As Images / Report Save As / Backup Patient Archive and Report Archive from Utility |

## Users

The Users screen allows you to define user IDs. It also allows you to specify operators registration, operator's rights setting, and registration of staff related to an examination (for example, referring and interpreting physicians).

Figure 16-67. Users Preset Menu

Table 16-79: User List

| Preset Parameter | Description |
|---|---|
| User List | Lists the user ID for all system users. |
| Identity | Type the operator's user ID, Password, Prefix, Last Name, First Name, Middle Name, Suffix, Phone Number. |
| Group Membership | Select the user's group: Operator (sonographers, doctors, or any person using the ultrasound system); Ref.Phys. (referring physician can be associated to the patient examination in the extended Patient information window); Perf.Phys. – physician performing the exam can be associated to the patient examination in the extended Patient information window. |
| Operator Rights | Admin – If selected, the operator has extended rights with access to the administrative setup functionality. The operator can also perform advanced operations |

### Creating a user

1. Press ***New***.
2. Type the user ID. ENSURE that you DO NOT include the following characters in a user's ID: slash (/), dash (-), asterisk (*), question mark (?), an underscore (_), or blank spaces. Also, DO NOT set up a user with the same intitials/ signifier.
3. Type the user's information in the Identity section.
4. Select the user's group(s).
5. If the user needs full configuration and advanced operations access, select ***Admin***.
6. Press ***Save***.

*NOTE: DO NOT add users with the same initials/signifier. The system allows you to do this; however, the first user is erased and only the second remains.*

*NOTE: When adding a new user, press Add first. Then edit the ID from the default of "NewUser" and edit the other fields. DO NOT press Add again unless you actually want to create another user. Press Save after adding one or more users. The user listed as NewUser on the list will be updated with the edited ID when you re-enter this screen.*

### Changing a user configuration

1. Move the **Trackball** to a user ID in the User List.
2. Make the desired changes.

### Deleting a user

1. Move the **Trackball** to a user ID in the User List.
2. Select ***Remove***.

   The user is removed from the User List.

## Logon

The Logon section defines log on procedures.

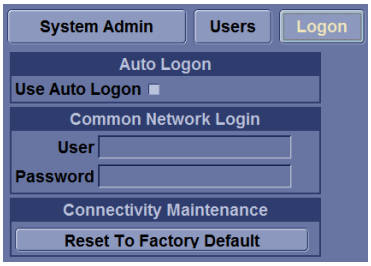



Figure 16-68. Administrative Logon Preset Menu

Table 16-80: Logon

| Preset Parameter | Description |
|---|---|
| Auto Logon | Specifies logon procedures:<br>• When blank, the user must select a user ID and enter a password when logging on.<br>• When selected, the system is started automatically, using the last user logon. |
| Common Network Login | Specifies the user ID and password used to access the network.<br>• User – User ID for network access<br>• Password – Password for network access |
| Connectivity Maintenance | Reset to factory default. |

# Scan Assistant

## Scan Assistant Manager

Please refer to Chapter 6 for information on using the Scan Assistant Manager to Import and Export Scan Assistant Programs. This section covers how to use the Scan Assistant Creator and how to export the Scan Assistant Creator from the LOGIQ S7 Expert/Pro to a PC.

## Activating the Scan Assistant Creator

To activate the Scan Assistant Creator on the LOGIQ S7 Expert/Pro, press the Creator key.

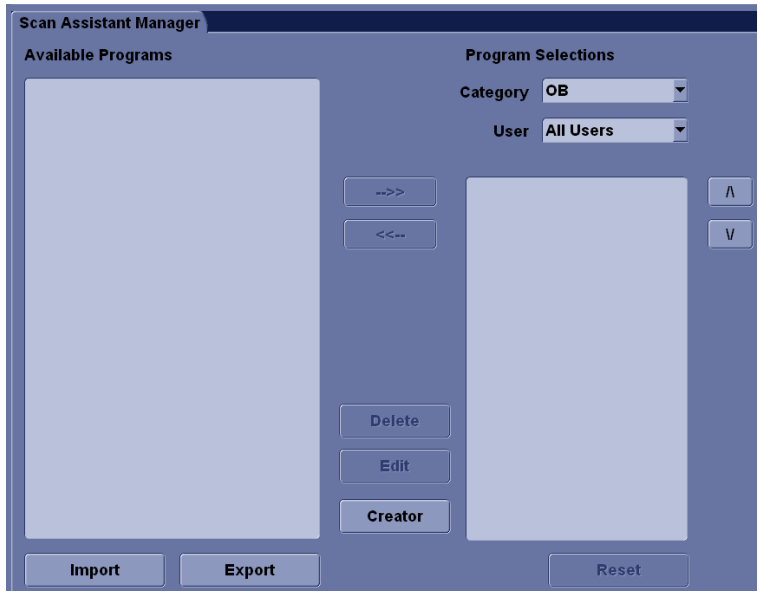



Figure 16-69. Scan Assistant Manager

# Scan Assistant Creator

## Overview

The Scan Assistant Creator is used to build customized Programs that can be imported onto the LOGIQ S7 Expert/Pro. These Programs automate many of the steps normally performed manually by the user, thereby reducing the number of user actions and the amount of time to perform an exam.

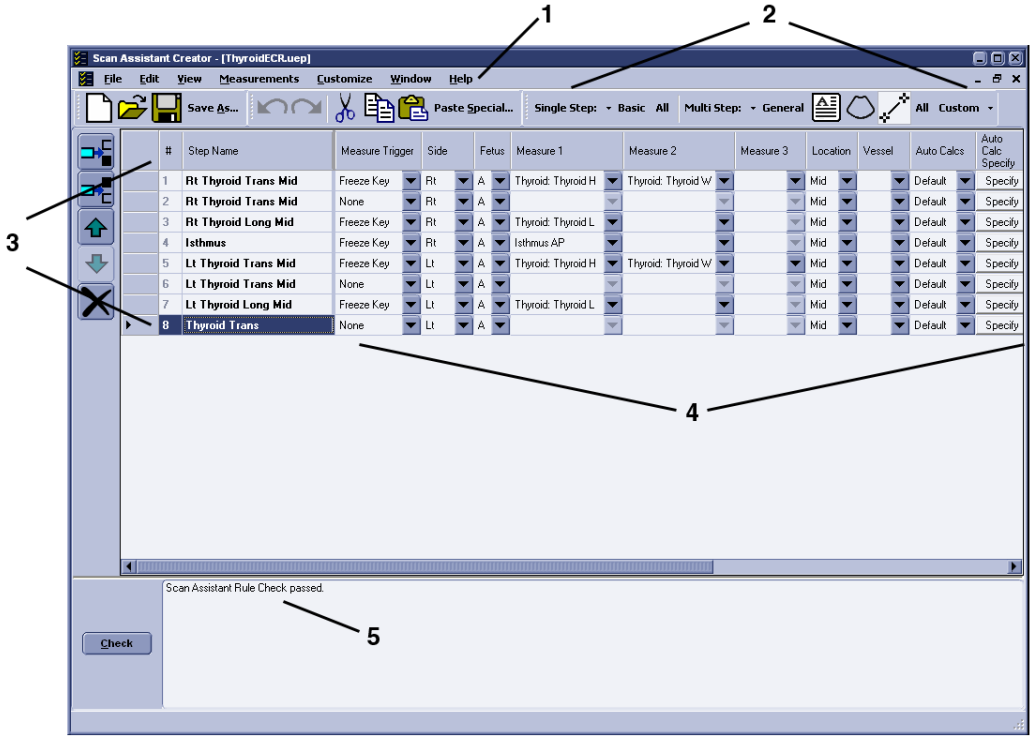



Figure 16-70. Tool Layout Overview

1. Menu
2. Toolbars
3. Steps
4. Step Attributes
5. Rule Checking

## Overview (continued)

The Scan Assistant Creator tool can be used both on the scanner and as an off scanner tool. Where there are differences in behavior, this user's guide uses the term 'on scanner' to indicate when the tool is running on the scanner and 'off scanner' to indicate when the tool is running off the scanner.

## File Handling

When using Scan Assistant Creator off the scanner, it is very important to organize the programs in a way that will make it easy to import the programs onto the scanner. Each Program is a computer file. While these computer files can be copied, pasted and deleted like any other computer file, the Program files are only viewable using the Scan Assistant Creator.

### Off-Scanner Directory Structure

The Scan Assistant Creator organizes the Programs in a directory structure that allows easy importing into the LOGIQ S7 Expert/Pro. In order to be imported, all Programs must be stored in a LOGIQ_SCAN_ASSISTANT Programs Directory. Within this directory, one or more user-specified directories are created. Within each of these user-specified directories are the category directories (VAS, ABD, etc.) that hold the actual Programs.

The dialog in the figure below allows the user to specify the location of the LOGIQ_SCAN_ASSISTANT directory (root directory) and to either select an existing User Program Directory or create a new one.

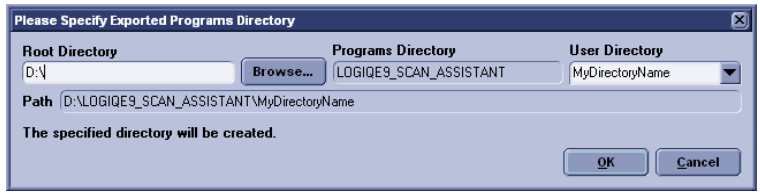



Figure 16-71. Directory Structure

**Off-Scanner Directory Structure (continued)**

The Directory Structure dialog can be accessed via the File menu.

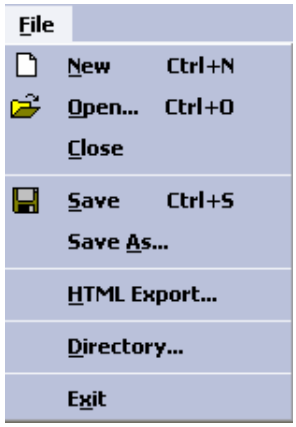



Figure 16-72. File Menu

Figure 16-73. File Toolbar

**File Extensions**

Factory defined Programs have an .ep (exam Program) extension while user-defined Programs have an .uep (user exam Program) extension. Both factory and user-defined Programs can be read into the Scan Assistant Creator, but only user-defined Programs are created. If a factory Program is read into the Scan Assistant Creator and then edited, it is saved as a user-defined Program.

Upon installation of the Scan Assistant Creator, files with a .ep or .uep extension are automatically associated with the Scan Assistant Creator.

### Exporting Programs from LOGIQ S7 Expert/Pro

Factory or user-defined Programs on the LOGIQ S7 Expert/Pro are easily exported for editing with the Scan Assistant Creator.

On the LOGIQ S7 Expert/Pro:

1. Insert a USB storage device (or CD/DVD).
2. Select ***Utility*** -> ***Scan Assistant***.
3. Select **Export**.
4. Select the media type and specify a directory. If a directory is specified that already exists, the Export adds the Programs along with any existing Programs. If the names of Programs are the same, use the resulting dialog to decide how to continue.
5. Select the Program to be exported and export them.

On the computer with the Scan Assistant Creator installed:

1. Insert the USB storage device (or CD/DVD) used above.
2. Copy the LOGIQ_SCAN_ASSISTANT directory from the USB storage device (or CD/DVD) to the hard drive. The hard drive directory that you copy to is the root directory. If you want to work with the Programs directly on the USB storage device, this step can be skipped.
3. Either open a Program by double-clicking it or selecting File '-> Open from the Scan Assistant Creator.

### Importing Programs to LOGIQ S7 Expert/Pro

Programs created with the Scan Assistant Creator are easily imported to the LOGIQ S7 Expert/Pro.

On the computer with the Scan Assistant Creator installed:

Copy the complete LOGIQ_SCAN_ASSISTANT directory from the computer hard drive to a USB device (or CD/DVD). The LOGIQ_SCAN_ASSISTANT directory needs to be at the top level (not in a subdirectory) on the USB device (or CD/DVD).

Example of Directory structure:

LOGIQ_SCAN_ASSISTANT

MyUserNameDirectory

ABD

CARD

GYN

OB

PED

SMP

UR

VAS

On the LOGIQ S7 Expert/Pro:

1. Insert the USB device (or CD/DVD).
2. Select ***Utility*** -> ***Scan Assistant***.
3. Select **Import**.
4. Select the media type.
5. Select the Programs to be imported and import them. If you attempt to import Programs that already exist with the same name, use the resulting dialog to decide how to continue.

### Creating New Programs

A new Program is created by selecting File -> New, by clicking on the New document icon in the Toolbar, or by using the keyboard shortcut Ctrl+N.

1. Before creating a New Program, select ***Single Step*** or ***Multi Step*** in the Toolbar.

Figure 16-74. File Toolbar

2. Proceed to add/update your settings for the Step: Step Name, Instructions, etc.
3. Once finished, highlight the finished Step.

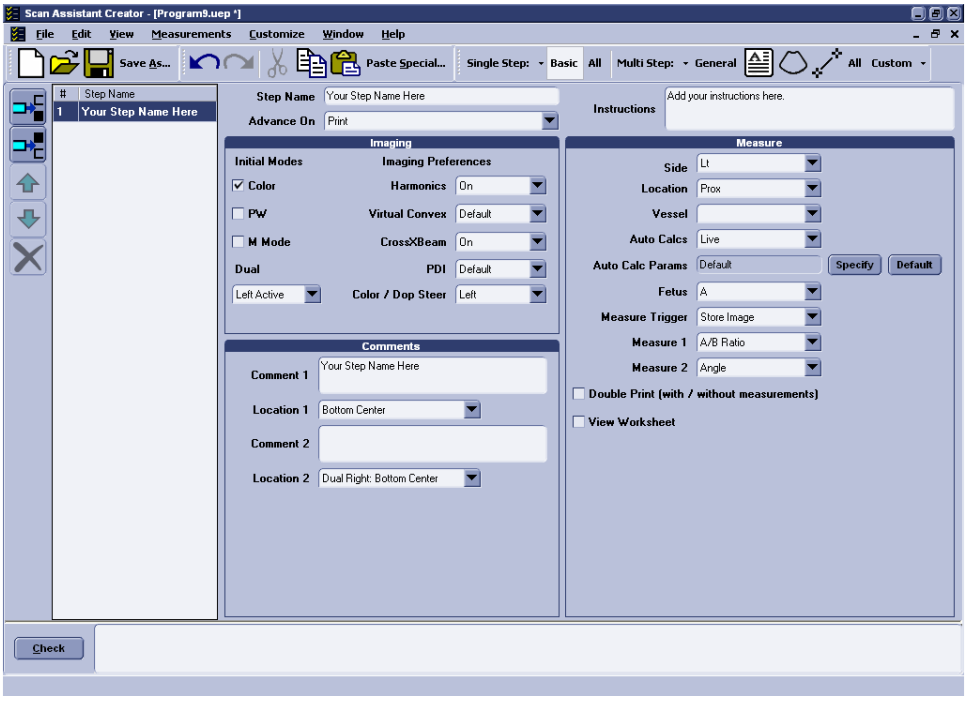



Figure 16-75. Highlight Step to Copy

**Creating New Programs (continued)**

4. Select **Edit** -> **Copy**

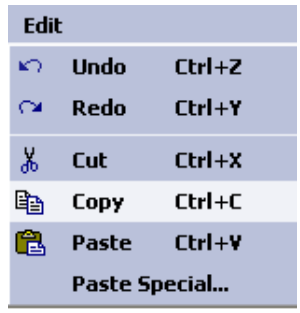



Figure 16-76. Edit -> Copy

5. In the Toolbar along the left, select **Insert Step Before Selected** or **Insert Step After Selected**.

Figure 16-77. Insert Step

6. Highlight the copied step and proceed to edit accordingly.
7. Proceed to follow the same procedure to add more steps to your Program.

**Creating New Programs (continued)**

8. When you are done, select **Check** to verify your Steps.

Figure 16-78. Rule Check and results area

9. The results are listed as to whether the Scan Assistant Rule Check Passed or if any Issues were detected. Issues found when running the check do not mean the Program is unusable.

*NOTE: The rule check may report an unequal number of left and right steps. This may or may not be the expected result. If a change is made in response to the rule check results, a new rule check can be run to see if the issue has been resolved.*

**Opening New Programs**

Multiple Programs can be open at the same time by selecting File -> Open. Each Program will open within the primary Scan Assistant Creator window.

**Opening Existing Programs**

An existing Program is opened by selecting File -> Open, by clicking on the File -> Open icon in the Toolbar, or by using the shortcut Ctrl+O. Finding the Program file (.ep or .uep) and opening the file automatically opens the file in the Scan Assistant Creator. Multiple Programs can be opened at the same time.

### Saving Programs

Programs are saved via the Save or Save As functions available on the File Menu and the File Toolbar. Save is also available via the Ctrl+S keyboard shortcut. "Save" saves the Program using its current name and file location. "Save As" allows the name and file locations to be edited.

When Saving a Program, the Scan Assistant Creator provides an opportunity to run a rule check on the Program before saving it as shown in the following figure. **Yes** runs the rule check, **No** bypasses the rule check and **Cancel** cancels the Save request. See ‘Rule Checking’ on *page 16-165* for more details on Rule Checking Programs.

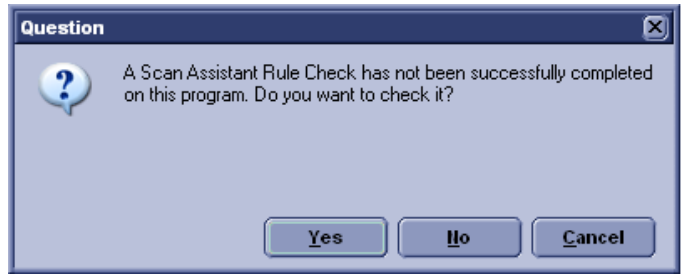



Figure 16-79. Program Rule Check Reminder

*NOTE: The name of a Program is appended with an asterisk (*) when the Program has been changed, but those changes have not yet been saved*

A Program can be closed without saving it using the Close selection on the File Menu or by using the "X" in the upper right corner of the Program window.

### Sharing Programs

If you want to share a program with someone else, the file can simply be sent via e-mail as an attachment or copied onto a media. If the person receiving the program has the Scan Assistant Creator tool installed, he can simply open the file and then use “Save As” to save it to an appropriate directory. See Section 3.1. If the person receiving the program does not have the Scan Assistant Creator tool installed, he can still load the program onto a scanner by creating the following directory structure on a media device, copying the file to one of the category directories and then importing the protocol onto the scanner.

Top Level Directory on media: LOGIQ_SCAN_ASSISTANTUser Program Directory: Any user nameCategory Directories: Abd, Card, Gyn, OB, Ped, SMP, UR, Vas

If you want to share an entire portfolio of programs with some else, the entire user program directory can be zipped. Make sure to set the options to include subfolders and to include relative path information. On the receiving end, the user can unzip the directory into a LOGIQ_SCAN_ASSISTANT directory.

## Views

A Program is made up of a series of steps. Each step is made up of various step attributes. The step and step attribute data can be viewed in many ways using the Scan Assistant Creator. The different ways to look at the data are called Views. The view of choice is selected from the View Selection Menu or the View Toolbar Menu.

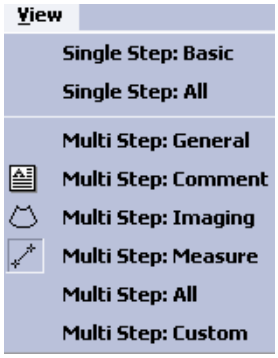



Figure 16-80. View Selection Menu

Figure 16-81. View Toolbar Menu

### Single Step Views

There are two Single Step views: Basic and All. The Basic view shows the most common attributes of the selected step. The All view shows all of the attributes of a given step.

For both views, the step names are shown on the left with the active step highlighted. The step attributes appear on the right and are separated into four groupings:

General attributes at the top

Imaging and Comment attributes on the left

Measure attributes on the right.

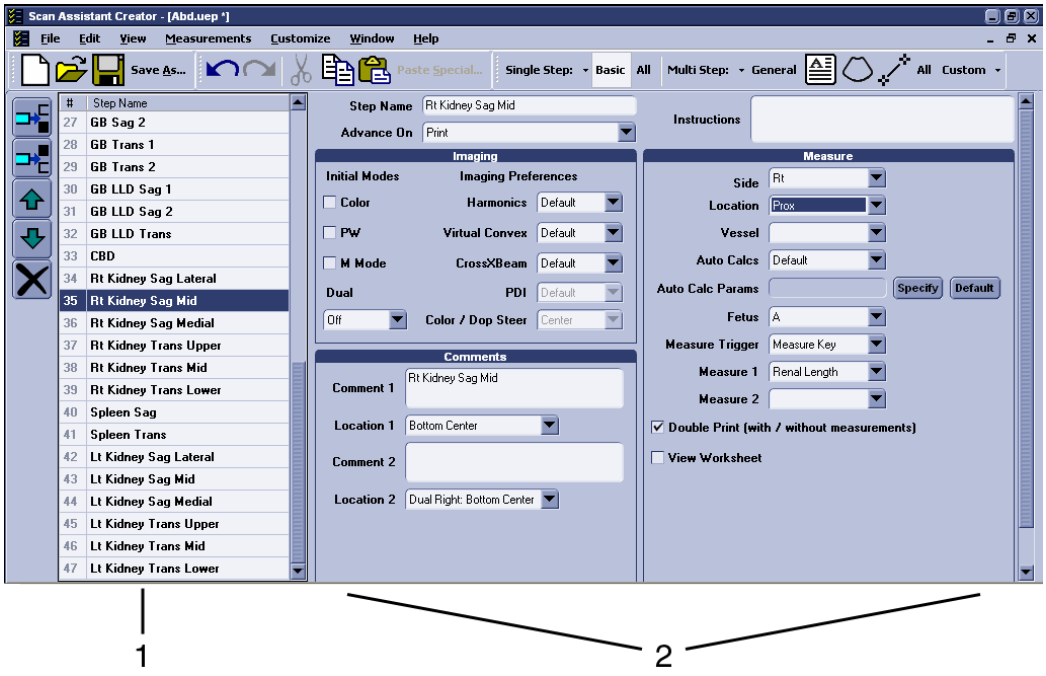



Figure 16-82. Basic Single Step View

1. Steps
2. Step Attributes

### Multi Step Views

Multi Step views show certain step attributes for all the steps in a Program. There are six Multi Step views: General, Comment, Scan, Measure, Custom and All.

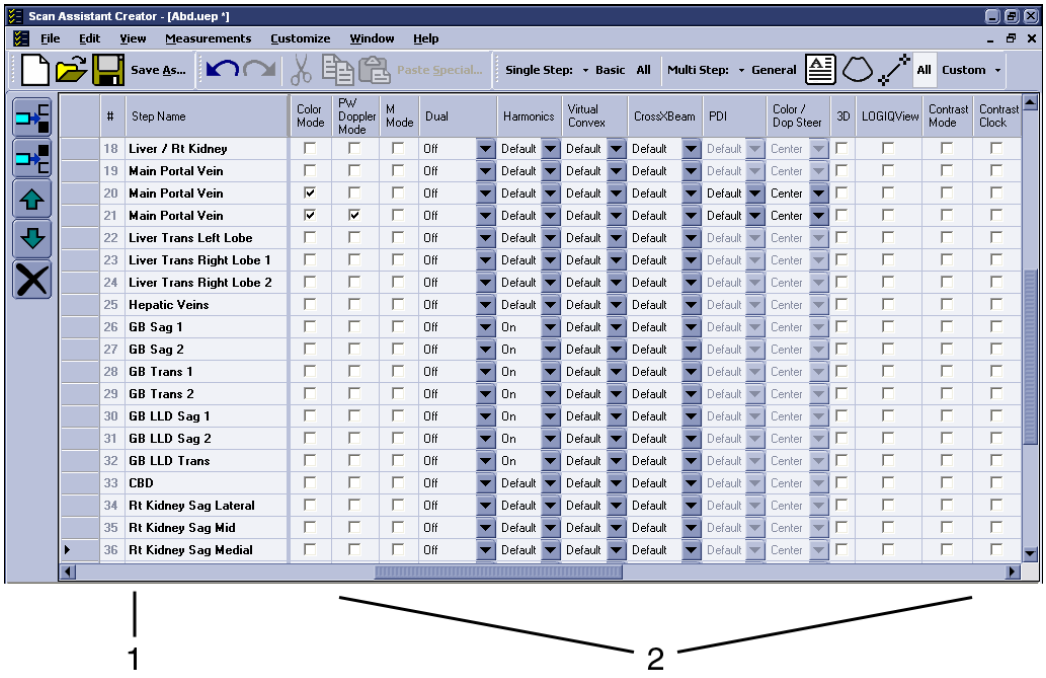



Figure 16-83. Multi Step Scan View

1. Steps
2. Step Attributes

### Customizing Multi Step Views

The contents of the Multi Step views is configurable via the Customize Menu or the small downward pointing arrow next to the word "Custom" on the View Toolbar Menu. In either case the Customize Multi Step Views dialog appears. Each tab represents a different Multi Step view. Within a tab, the checked boxes are the step attributes that are displayed in that Multi Step view.

See ‘Documenting Programs’ on *page 16-167* for details on the HTML Export Multi Step view.

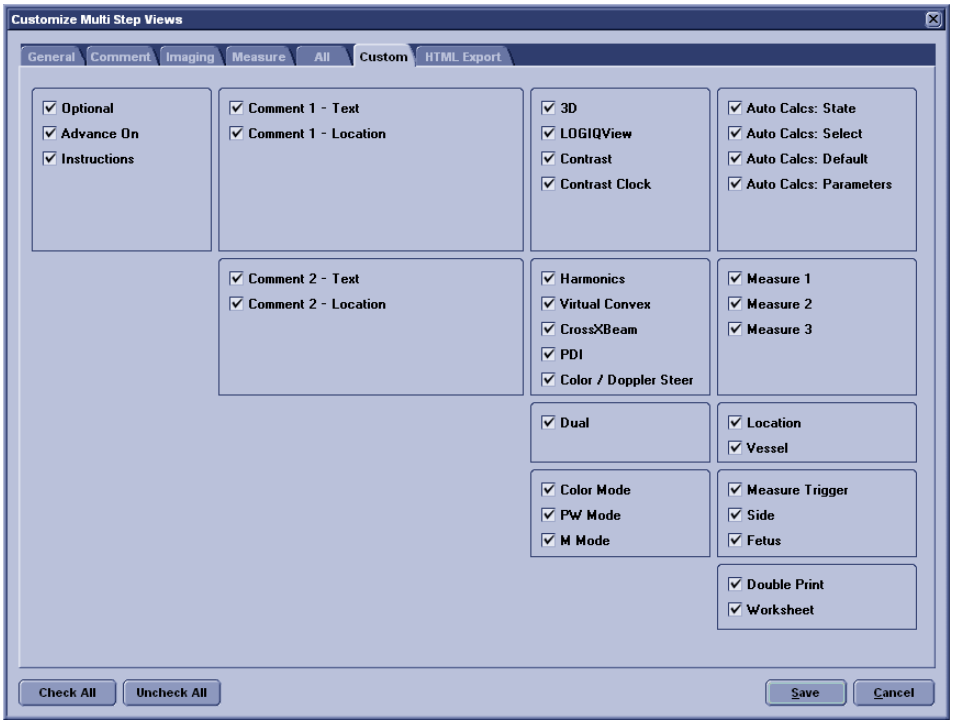



Figure 16-84. Customize Multi Step Views Dialog

## Scan Assistant Features

Scan Assistant allows the user to program the steps in an exam and to program certain attributes for each step. The attributes are what give the Scan Assistant Program behavior. The tables below provide the names of all attributes along with a description of how each one is interpreted by the Scan Assistant feature.

**General Attributes**

Table 16-81: General Attributes

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Step Number | Numeric | Number of the step that appears in the Scan Assistant Navigation menu | 1 | Previous plus one |
| Step Name | Any | Name of the step that appears in the Scan Assistant Navigation menu | Step Name | Same as previous step |
| Advance On | Print | Advance to the next step and go live after Print / Image Store (e.g P1 key). This can be a single image store or a loop store. | Print | Same as previous step |
| | Print & Unfreeze | Advance to the next step after Print / Image Store (e.g. P1 key) and unfreeze. This can be a single image store or a loop store. | | |
| | User Selection | Advance to next step only after next step is manually selected (e.g. down arrow) | | |

Table 16-81: General Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Instructions | [Any Text] | User notes displayed in the Scan Assistant Navigation menu when the step is active | Blank | Same as previous step |
| Optional | Optional (checked) | An optional step is given a check mark during Program execution even if no image is acquired | Mandatory | Same as previous step |
| | Mandatory (unchecked) | A mandatory step is given a check mark only if an image is acquired for the step | | |

**Comment Attributes**

Table 16-82: Comment Attributes

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Comment 1, Comment 2 | [Any Text] | User annotation associated with the step. When editing in a Multi Step View, use Alt+Enter to create a new line. | Same as Step Name attribute | Same as Step Name attribute |
| Location 1, Location 2 | Top Left | Annotation is placed in the top left corner of the image area | Location 1: Bottom Center | Same as previous step |
| | Middle Left | Annotation is placed in the middle left side of the image area | | |
| | Bottom Left | Annotation is placed in the bottom left corner of the image area | Location 2: Dual Right: Bottom Center | |
| | Top Center | Annotation is placed in the top center of the image area | | |
| | Bottom Center | Annotation is placed in the bottom center of the image area | | |

Table 16-82: Comment Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| | Top Right | Annotation is placed in the top right corner of the image area | | |
| | Mid Right | Annotation is placed in the middle right side of the image area | | |
| | Bottom Right | Annotation is placed in the bottom right corner of the image area | | |
| | Dual Left: Bottom Center | Annotation is placed on the bottom center of the left image in dual screen | | |
| | Dual Left: Top Left | Annotation is placed on the top left of the left image in dual screen | | |
| | Dual Right: Bottom Center | Annotation is placed on the bottom center of the right image in dual screen | | |
| | Dual Right: Top Left | Annotation is placed on the top left of the right image in dual screen | | |

### Imaging Mode Attributes

The probe and application associated with a program is not configurable. Instead, the scanner remembers the last probe and application used for a given Scan Assistant program and automatically selects them the next time the program is started.

Table 16-83: Imaging Mode Attributes

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Color Mode | On (checked) | Color Doppler is on | Off | Same as previous step |
| | Off (unchecked) | Color Doppler is off | | |
| PW Doppler Mode | On (checked) | PW Doppler is on. If PW Doppler is not on and the new activated step indicates that Doppler should be on, the Mode Cursor is displayed or, if the Mode Cursor is already displayed, then PW Doppler is turned on. | Off | Same as previous step |
| | Off (unchecked) | PW Doppler is off | | |
| M Mode | On (checked) | M-Mode is on | Off | Same as previous step |
| | Off (unchecked) | M-mode is off | | |

Table 16-83: Imaging Mode Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Dual | Off | Dual screen not in use | Off | Same as previous step |
| | Left Active | Dual screen is active and the left image is the active image. | | |
| | Right Active | Dual screen is active and the right image is the active image. | | |
| | DualView (simul) | DualView is active (both left and right images are live) | | |
| 3D | On (checked) | 3D on | Off | Same as previous step |
| | Off (unchecked) | 3D off | | |
| LOGIQView | On (checked) | LOGIQView on | Off | Same as previous step |
| | Off (unchecked) | LOGIQView off | | |
| Contrast Mode | On (checked) | Contrast mode on | Off | Same as previous step |
| | Off (unchecked) | Contrast mode off | | |
| Contrast Clock | On (checked) | Contrast Clock on | Off | Same as previous step |
| | Off (unchecked) | Contrast Clock off | | |

### Imaging Preference Attributes

Imaging Preferences work slightly different than other attributes. For example, if an abdomen Program has 20 steps and all steps have the Harmonics attribute set to Default, then Scan Assistant will not affect the harmonics setting. Now, assume that steps 10-12 are gallbladder steps and that the harmonics attribute has been set to on for these steps. When transitioning into this group of steps (step 9 to step 10, e.g.), harmonics will be turned on (or remain on if it was previously on). If harmonics is then manually turned off in step 10 then Scan Assistant will not turn it back on when advancing to step 11. In other words, a group of consecutive steps with the same Imaging Preference are treated as a group by Scan Assistant and not as individual steps.

Table 16-84: Imaging Preference Attributes

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Harmonics | Off | Harmonics off | Default | Same as previous step |
| | On | Harmonics on | | |
| | Default | Harmonics not specified. Scan Assistant does not set Harmonics on or off. | | |
| Virtual Convex | Off | Virtual Convex off | Default | Same as previous step |
| | On | Virtual Convex on | | |
| | Default | Virtual Convex not specified. Scan Assistant does not set Virtual Convex on or off. | | |

Table 16-84: Imaging Preference Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| CrossXBeam | Off | CrossXBeam off | Default | Same as previous step |
| | On | CrossXBeam on | | |
| | Default | CrossXBeam not specified. Scan Assistant does not set CrossXBeam on or off. | | |
| PDI | Off | PDI off | Default | Same as previous step |
| | On | PDI on | | |
| | Default | PDI not specified. Scan Assistant does not set PDI on or off. | | |
| Color/Doppler Steer | Left | Color/Doppler steered to the left | Center | Same as previous step |
| | Center | Color/Doppler not steered | | |
| | Right | Color/Doppler steered to the right | | |

**Measurement Attributes**

Table 16-85: Measure Attributes

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Measure Trigger | Measure Key | Initiate "Measure 1" attribute when the Measure key is manually selected. | None | None |
| | Freeze Key | Initiate "Measure 1" attribute when the image is frozen. | | |
| | Image Store | Initiate "Measure 1" attribute when the Measure key is manually selected or the image is stored. This is used to store / print an image and then measure on it and then store it again. Therefore, the Advance On Print attribute is ignored on the first store / print when the Measure Trigger attribute is set to Image Store. | | |
| | None | Measurements are not triggered by Scan Assistant. The "Measure 1" attribute is ignored. | | |

Table 16-85: Measure Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Side | Rt | The side measurement qualifier is set to Right side of the body | Rt | Derived from Step Name attribute if possible. Otherwise, same as previous step |
| | Lt | The side measurement qualifier is set to Right side of the body | | |
| | None | The side measurement qualifier is not used (neither Right nor Left) | | |
| Fetus | A | The fetus measurement qualifier is set to Fetus A | A | Same as previous step |
| | B | The fetus measurement qualifier is set to Fetus B | | |
| | C | The fetus measurement qualifier is set to Fetus C | | |
| | D | The fetus measurement qualifier is set to Fetus D | | |
| Location | Prox | The location measurement qualifier is set to Proximal | Prox | Same as previous step |
| | Mid | The location measurement qualifier is set to Middle | | |
| | Dist | The location measurement qualifier is set to Distal | | |
| | None | The location measurement qualifier is not used | | |

Table 16-85: Measure Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Measure 1 | Various 2D or M-mode measurements | Specifies the first 2D or M-mode measurement to be initiated. The point at which the measurement is initiated is based upon the Measure Trigger attribute. See Section 6 for more information. | Blank | Blank |
| Measure 2 | Various 2D or M-mode measurements | Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 1 attribute is completed. See Section 6 for more information | Blank | Blank |
| Measure 3 | Various 2D or M-mode measurements | Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 2 attribute is completed. See Section 6 for more information. | Blank | Blank |
| Vessel | Various Doppler measurement Vessel folders | Specifies the Vessel folder to assign auto calcs to. The assignment happens when the image is stored / printed (e.g. P1 key). See Section 6 for more information. | Blank | Blank |

Table 16-85: Measure Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Auto Calcs | Default | Auto Calcs state not specified. Scan Assistant does not set Auto Calcs state. | Default | Same as previous step |
| | Off | Auto Calcs state set to Off | | |
| | Frozen | Auto Calcs state set to Frozen | | |
| | Live | Auto Calcs state set to Live | | |
| Auto Calc Params | Various Auto Calc parameters | Specifies the auto calc parameters to be used. | Default | Same as previous step |
| | Default | Auto Calc parameters are not specified. Scan Assistant does not set the Auto Calc parameters. | | |
| Auto Calc Specify | [Not Applicable] | Button used to enable the Auto Calcs Parameter Selection dialog so that the Auto Calc Params attribute can be set | [Not Applicable] | [Not Applicable] |
| Auto Calc Default | [Not Applicable] | Button used to set the Auto Calcs Params attribute to Default. | [Not Applicable] | [Not Applicable] |
| Double Print | On (checked) | If an Image Store / Print (P1 key, e.g.) is performed on an image with measurements, the image is stored / printed two times, once with the measurements and once without. | Off | Same as previous step |
| | Off (unchecked) | No special Store / Print behavior. | | |

Table 16-85: Measure Attributes (Continued)

| Attribute Name | Selections | Description | First Step Default | Other Steps Default |
|---|---|---|---|---|
| Double Print | On (checked) | If an Image Store / Print (P1 key, e.g.) is performed on an image with color, the image is stored / printed two times, once with color and once without. If double print on color and double print on measurements are both configured to be on, the image is stored / printed two times, once with the measurements and once without. | | |
| | Off (unchecked) | No special Store / Print behavior. | | |
| View Worksheet | On (checked) | The worksheet is turned on | Off | Off |
| | Off (unchecked) | The worksheet is not turned on | | |

## Measurements

Because there are many measurements available on the LOGIQ S7 Expert/Pro and because the measurement package is highly customizable, there is some special handling for measurements. The Measurement attributes affected by this special handling are Measure 1-3 and Vessel.

### Selecting a Measurement Package

The Measurement selection menu can be used to specify which measurement package is to be used for the Program. The Measurements packages are organized by category and subcategory. The choices for the Measure 1-3 and Vessel attributes are limited by the selection of category and subcategory. To select a subcategory, select a category, move to the subcategory list and select a subcategory. To select all subcategories for a given category, select the category and then reselect the Measurements menu item to remove the menu.

A single Program is not allowed to have measurements from multiple categories, but it may have measurements from multiple subcategories.

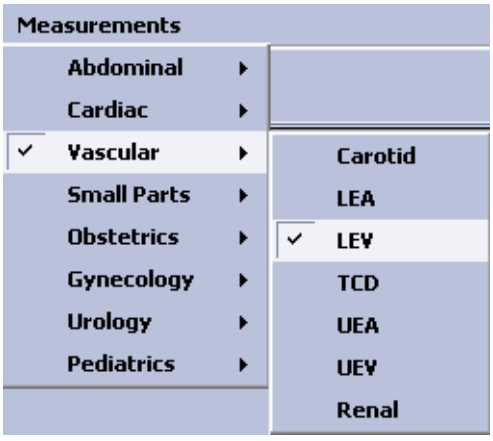



Figure 16-85. Measurements Menu

### User-Defined Measurements

User-defined subcategories and individual measurements can be used with the Scan Assistant feature. To do so, the Scan Assistant Creator needs to know about the user-defined measurements on the LOGIQ S7 Expert/Pro.

On the LOGIQ S7 Expert/Pro, use the Scan Assistant utility menu to Export Programs to a USB storage device (or CD/DVD). On the export menu, check the "Export user config data" checkbox to store the user-defined measurement information to the Program User Directory on the media. The name of the file is UserConfigSystemFile.res. When this file exists in the Program User Directory, then it is used. Otherwise, the default file installed with the Scan Assistant Creator is used.

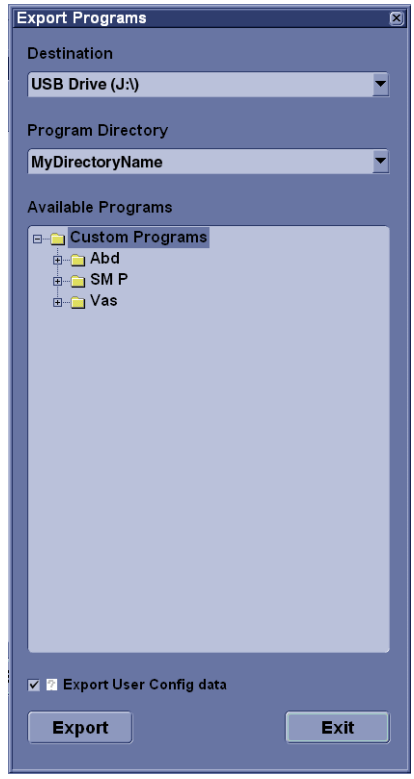



Figure 16-86. Program Export Menu on LOGIQ S7 Expert/Pro

## Navigating Programs

In addition to moving the windows pointer and selecting an item, there are several keyboard controls that navigate a Program.

Table 16-86: Keyboard Program Navigation

| Keyboard Entry | Step Selected | Step Attribute Selected |
|---|---|---|
| Enter | Moves to next step. If on the last step, it creates a new step and selects it. | Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to same step attribute in the next step. If on the last step, it creates a new step and selects it. |
| Tab | Single Step View: Moves to next step. On the last step it moves to the first step attribute.Multi Step View: Moves to the first step attribute. | Moves to next step attribute. If last attribute for the step, moves to next step. |
| Alt+Tab | Single Step View: Moves to previous step. On the first step it moves to the last step attribute.Multi Step View: Moves to the last step attribute of the previous step. | Moves to next step attribute. If first attribute for the step, moves to previous step. |
| Up Arrow | Moves to previous step | Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to same step attribute in the previous step. |
| Down Arrow | Moves to next step | Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to same step attribute in the next step. |
| Left Arrow | No action | Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to the previous step attribute. |

Table 16-86: Keyboard Program Navigation (Continued)

| Keyboard Entry | Step Selected | Step Attribute Selected |
|---|---|---|
| Right Arrow | Single Step View: No action.Multi Step View: Moves to the first step attribute. | Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to next step attribute. |
| Page Up | Scrolls to previous page of steps | Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to same step attribute in the previous step. |
| Page Down | Scroll to next page of steps | Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to same step attribute in the next step. |

## Editing Programs

When editing Programs, changes can be made at both the step level and the step attribute level. Steps can be added, inserted, moved, deleted, copied and pasted. Step attributes can be modified for a given step or across multiple steps.

### Editing Steps

The step toolbar allows steps to be inserted, moved up and down, and deleted. For steps to be moved, one or more consecutive steps must be selected. Some of the controls have shortcuts (Control Key + another key).

When the last step in a Program is selected, the Enter key automatically appends a new step to the end of the Program and selects the new step. When the Enter key is pressed on any other step, the next step is activated. The up and down arrows can also be used to move between steps.

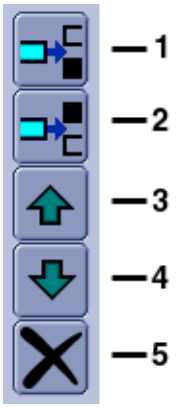



Figure 16-87. Step Toolbar

1. Insert Step above selected step (Ctrl+I)
2. Insert Step below selected step
3. Move selected step(s) up (Ctrl+Up Arrow)
4. Move selected step(s) down (Ctrl+Down Arrow)
5. Delete selected step(s)

**Editing Steps (continued)**

The Edit Menu and Edit toolbar provides access to the Cut, Copy, Paste and Paste Special features. The Undo and Redo actions also appear on Edit Menu and Edit Toolbar.

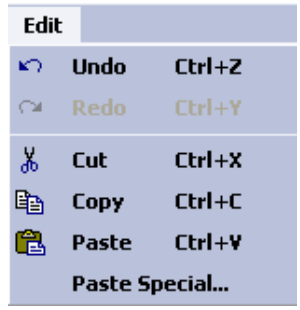



Figure 16-88. Edit Menu

Figure 16-89. Edit Toolbar

When selecting multiple steps for Cutting or Copying, the Shift + Left Mouse and Ctrl + Left Mouse key combinations can be used. Multiple steps are also selected by holding the Left Mouse key and dragging across the steps of interest. When pasting steps they are added after the currently selected step.

The Paste Special control allows copied steps to be pasted with some modification. For example, the steps associated with the Right Kidney can be Copied and Pasted so that they are converted into Left Kidney steps during the paste. The Paste Special dialog is shown in the figure below . Simply select the desired Conversion and choose the "Paste" key.

**Editing Steps (continued)**

- Step Name (Text)
- Comment 1 (Text)
- Comment 2 (Text)
- Side (Measurement qualifier)
- Location (Measurement qualifier)
- Fetus (Measurement qualifier)

Figure 16-90. Paste Special Dialog

**Editing Steps (continued)**

The Define Conversions key is used to define the text that is converted. An example is shown in the figure below. If an exact case match is found, it is used for the conversion. If there is a match, but with different case, it is used only if there is not an exact case match.

There are 3 user-defined conversions that can be edited and named. These user-defined conversions can also be used to perform a find and replace capability.

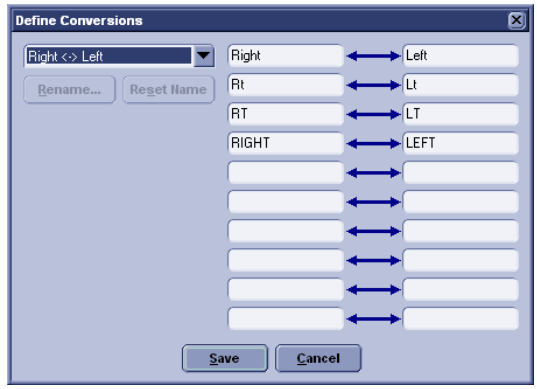



Figure 16-91. Define Conversions Dialog

### Editing Step Attributes

To edit a step attribute simply select the step attribute and edit it, such as picking from a drop down menu, checking or unchecking a box or typing in text. To edit multiple steps in a Multi Step view, select the step attribute of choice and do the following actions:

- Set the value of the step attribute as desired.
- Left click (and release) in the square in the bottom right-hand corner of the attribute.
- Drag to highlight the other steps to be changed in the same way.
- Left click (and release) again.

This will take the original step's content and copy it down the highlighted steps. This is also available when multiple attributes are selected within the same step.

To edit multiple steps in the single step view, highlight the multiple steps that you want to edit and then change the step attribute. If a step attribute is highlighted in green, this indicates that its current value varies across the selected steps.

If a step attribute is not editable, it may be because the attribute requires a different attribute to be set a particular way in order to become enabled. These dependencies are outlined below.

Table 16-87: Step Attribute Dependencies

| Step Attribute | Dependency |
|---|---|
| PDI | Color step attribute must be checked |
| Color / Dop Steer | Color or PW step attribute must be checked |
| Measure 1 | Measure Trigger must not be set to None |
| Measure 2 | Measure 1 must be set |
| Measure 3 | Measure 1 and Measure 2 must be set |

### Editing Multiple Programs

Multiple Programs can be opened at the same time. To switch between Programs, the title banner of the window is selected or the Program is selected from the Window Menu. An asterisk indicates that the Program has been edited but not saved.

Figure 16-92. Window Menu

With multiple Programs open, steps copied from one Program can be put inserted into another Program via the paste or paste special features.

### Undo/Redo

The Undo feature allows the previous action to be undone. For example, pressing undo 6 times will undo the last 6 changes. Redo cancels the Undo of an action. For example, pressing undo 6 times will undo the last 6 changes and then pressing Undo 2 times will cause only the last 4 actions to be undone.

### Editing the Current Program on the Scanner

If you are currently using a Scan Assistant program and choose to edit that program while using it, the program will be reloaded when scanning is restarted. If the number of steps is changed, the checkmarks that were in place before editing are cleared. If the number of steps in the program has not changed, the checkmarks that were in place before editing are maintained.

The current program can be restarted at any time by selecting the Stop button on the Scan Assistant navigation window and selecting restart.

## Rule Checking

Scan Assistant Creator allows Programs to be checked. During a rule check, Scan Assistant Creator applies a series of rules against the Program being checked and reports any inconsistencies between the rules and the Program. This rule check is intended to find potential issues in the Program before it is tested on a LOGIQ S7 Expert/Pro. Issues found when running the check do not mean the Program is unusable. It means that if there happens to be a problem with running the Program, the first place to look would be at the Issue noted when you ran the Check.

For example, if there is a step name Right Kidney and the Measurement Location is set to "Left", the rule check would report this inconsistency.

### Running a Rule Check

The "Check" button below the Program area is used to initiate a rule check. The results are displayed in the Rule Check Results window to the right of the button. A rule check is also initiated when attempting to save a Program that has not previously passed a rule check.

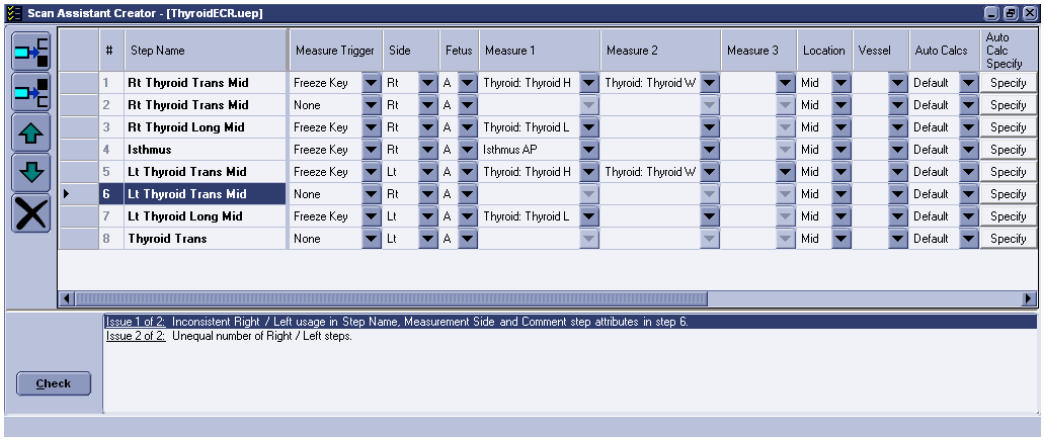



Figure 16-93. Rule Check Button and Rule Check Results

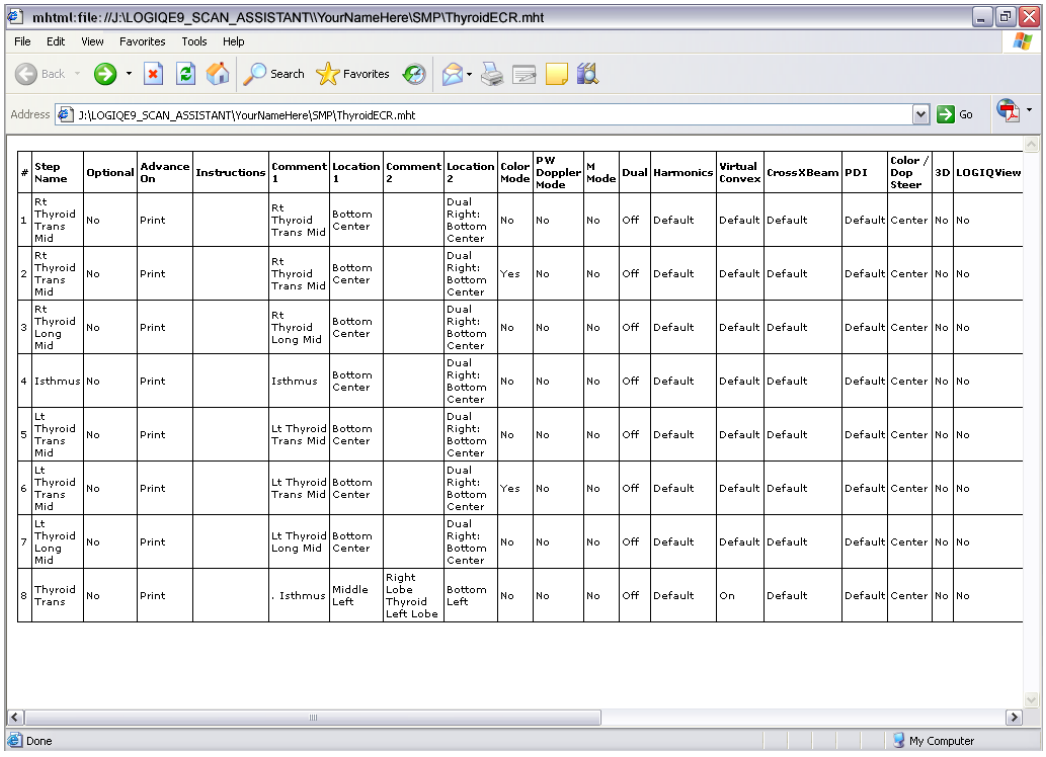
**Rule Check Results**

If the issue is specific to a particular step, double-clicking on the issue number in the Rule Check Results window selects the step associated with the issue. The results are intended to be potential issues and therefore may be ignored at the discretion of the user. For example, the rule check may report that there are an unequal number of left and right steps. For a particular Program, this may be the expected result. If a change is made in response to the rule check results, a new rule check can be run to see if the issue has been resolved.

## Documenting Programs

The HTML Export feature allows a Program to be stored in a file format (*.mht) that is compatible with Windows Internet Explorer. This file is useful for printing the Program or viewing the Program, but is not useful for editing the Program. HTML Export is available via the File Menu.

An example of how a Program looks in HTML format is shown below.




| # | Step Name | Optional | Advance On | Instructions | Comment 1 | Location 1 | Comment 2 | Location 2 | Color Mode | PW Doppler Mode | M Mode | Dual | Harmonics | Virtual Convex | CrossXBeam | PDI | Color / Dop Steer | 3D | LOGIQView |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Rt Thyroid Trans Mid | No | Print | | Rt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 2 | Rt Thyroid Trans Mid | No | Print | | Rt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | Yes | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 3 | Rt Thyroid Long Mid | No | Print | | Rt Thyroid Long Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 4 | Isthmus | No | Print | | Isthmus | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 5 | Lt Thyroid Trans Mid | No | Print | | Lt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 6 | Lt Thyroid Trans Mid | No | Print | | Lt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | Yes | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 7 | Lt Thyroid Long Mid | No | Print | | Lt Thyroid Long Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 8 | Thyroid Trans | No | Print | | . Isthmus | Middle Left | Right Lobe Thyroid Left Lobe | Bottom Left | No | No | No | Off | Default | On | Default | Default | Center | No | No |

Figure 16-94. HTML Export

The step attributes shown in the HTML Export are configurable via the Views selection on the Customize Menu.

## Customization

The Customize Menu is shown below. The Views selection allows the contents of the Multi Step views and HTML Export to be configured as described in ‘Customizing Multi Step Views’ on *page 16-140*.

Figure 16-95. Customize Menu

The Language selection allows the Scan Assistant Creator language to be configured.

The column widths of the steps and step attributes are customizable. The desired width is set by selecting and dragging the line separating column headers. These adjustments are remembered for the next time the Scan Assistant Creator is used.

The locations of the toolbars are customizable. The location is set by selecting and dragging the toolbar gripper as shown in the figure below. The toolbars can be placed at the top, left, right or bottom of the Scan Assistant Creator.

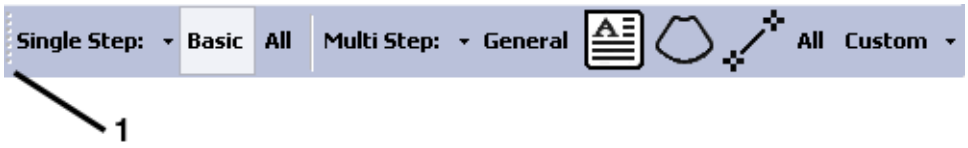



Figure 16-96. Gripper used for Toolbar placement

1. Toolbar Gripper

## Help

Help is available via the About Menu or the F1 key.

## Exporting the Scan Assistant Creator to a PC

To export the Scan Assistant Creator to a PC,

1. Insert a USB Flash Drive in a USB port on the Control Panel.
2. Press Utility--> Scan Assistant.
3. Press ***Export***.
4. Place a checkmark in the Export Scan Assistant Creator Installation.
5. Press ***Export***.

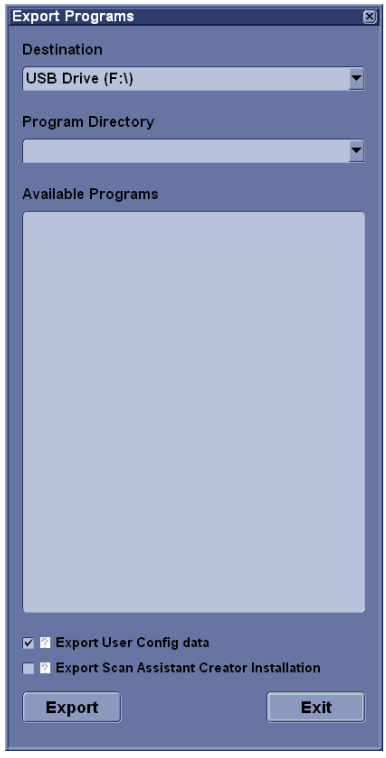



Figure 16-97. Export Scan Assistant Creator Installation

## Installation (Install from a zip file)

Create a directory called Scan Assistant Creator on your PC's hard drive under \Program Files\GE Healthcare\. It should look something like this:

Drive Letter:\Program Files\GE Healthcare\Scan Assistant Creator.

Unzip the contents of the zip file into the Scan Assistant Creator directory. After unzipping, go to the directory and double-click on the setup.exe file. Follow the steps in the setup wizard to complete installation.

To export the Scan Assistant Creator tool from the scanner for off scanner use, go to the Utility->Scan Assistant page on the LOGIQ S7 Expert/Pro scanner. Select the Export button. On the Export dialog, select the media to be exported to, select the 'Scan Assistant Creator Tool' check box and then choose Export. The files needed to install the tool off the scanner are copied to the media. Insert the media in the computer where you want to install the off scanner version and use the setup.exe file to initiate the installation.

### System Requirements

Scan Assistant Creator requires the Windows XP Professional Service Pack 2 or Windows Vista Business operating system. It also requires .NET Framework 2.0 Service Pack 1. If the computer does not have this installed, the installation utility will direct you to a link where it can be downloaded.

# Search

## Utility Parameter Search

Opens up a search window to find a parameter on the utility pages.

To search for a utility parameter,

1. Press ***Search***.
2. Type in the search string. For instance, if you're searching for Zoom you would just type 'zoom'.

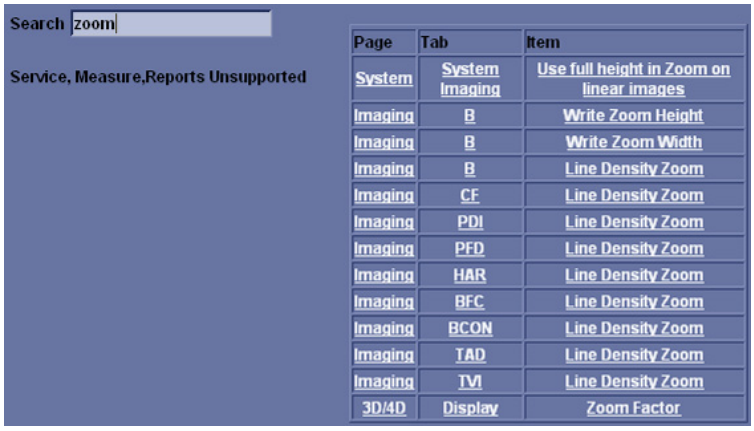



Figure 16-98. Search Example

3. A list of possible matches appears to the right. Select the correct match.

*NOTE: You cannot perform a search on the Measure, Reports or Service utility pages.*

# Measure

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up Measurement and Analysis Presets.

# Reports

Refer to Chapter 14 for more information.

# Service

Press Service to activate the Service browser interface.

# *Chapter 17*

# Probes and Biopsy

*This chapter consists of the information of each probe and describes some special concerns, biopsy kits and accessories as well as basic procedures for attaching a biopsy guide to the different types of probes.*

# Probe Overview

## Ergonomics

Probes have been ergonomically designed to:

- Handle and manipulate with ease
- Connect to the system with one hand
- Be lightweight and balanced
- Have rounded edges and smooth surfaces.
- Stand up to typical wear by cleaning and disinfectant agents, contact with approved gel, etc.

Cables have been designed to:

- Connect to system with appropriate cable length

## Cable handling

Take the following precautions with probe cables:

- Keep free from wheels
- Do not bend the cable acutely
- Avoid crossing cables between probes.

## Probe orientation

Each probe is provided with an orientation marking. This mark is used to identify the end of the probe corresponding to the side of the image having the orientation mark on the display.

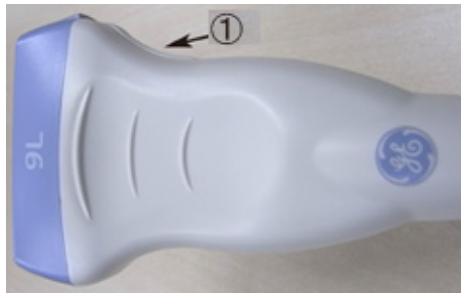



Figure 17-1. Orientation Marking on Probe (Example)

1. Notch

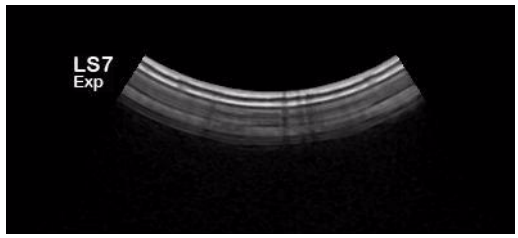



Figure 17-2. Probe orientation marker on the display

1. Orientation Marker

## Labeling

Each probe is labeled with the following information:

- Seller's name and manufacturer
- Operating frequency (not shown on all probes)
- GE part number
- Probe serial number
- Month and year of manufacture
- Probe designation-provided on the probe grip and the top of the connector housing, so it is easily read when mounted on the system and is also automatically displayed on the screen when the probe is selected.

## Supported probes

The LOGIQ S7 Expert/Pro supports the following types of probes:

- Sector Phased Array
- Linear Array
- Convex Array
- Micro convex Array
- Matrix Array
- Split Crystal

*NOTE: Not all probes described in this document may be available or cleared for sale in all markets.*

### Probe Naming Conventions

Table 17-1: Probe Naming Convention

| Type | Application | Frequency | Connector Type |
|---|---|---|---|
| C=Convex<br>L=Linear<br>M=Matrix<br>S=Sector | AB=Abdominal<br>IC=Intracavitary<br>NA=Neonatal<br>SP=Small Parts | “1-5” | D=DLP<br>DL=DL |

## Probe Description

Table 17-2: Probe Description

| Probe | Illustration | Application | Feature |
|---|---|---|---|
| C1-5-D | | Abdomen, Vascular, OB/ GYN, Urology | B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Contrast, Elastography, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D, Biopsy |
| 9L-D | | Abdomen, Small Parts, Vascular, Pediatric | B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D, Biopsy, B Steer+ |
| ML6-15 | | Small Parts, Vascular, Pediatric, Neonatal | B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D, Biopsy, B Steer+ |
| IC5-9-D | | OB/GYN, Urology | B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D, Biopsy |
| 3CRF-D | | Abdomen, OB/ GYN, Urology | B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D, Biopsy |
| L8-18i-D | | Small Pars, Vascular, Neonatal, Pediatrics | B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D, B Steer+ |

Table 17-2: Probe Description

| Probe | Illustration | Application | Feature |
|---|---|---|---|
| S4-10-D | | Pediatrics, Neonatal, Abdomen | B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D |
| P2D | | Cardiac, Vascular | CW, ASO |
| P6D | | Cardiac, Vascular | CW, ASO |
| RAB4-8-D | | Abdomen, OB/ GYN, Urology | B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, 3D/4D real-time imaging, Biopsy, Advanced 3D |
| 11L-D | | Small Parts, Vascular, Pediatric, Neonatal | B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D, Biopsy, B Steer+ |
| 3Sp-D | | Cardiac, Abdomen, Transcranial | B, CHI, CF, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ ASO, Stress Echo, SRI-HD, Advanced 3D, Biopsy |
| 8C | | Pediatrics, Neonatal | B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, SRI-HD, Advanced 3D |

# Probe Safety

## Probe handling and infection control

This information is intended to increase user awareness of the risks of disease transmission associated with using this equipment and provide guidance in making decisions directly affecting the safety of the patient as well as the equipment user.

Diagnostic ultrasound systems utilize ultrasound energy that must be coupled to the patient by direct physical contact. Depending on the type of examination, this contact occurs with a variety of tissues ranging from intact skin in a routine exam to recirculating blood in a surgical procedure. The level of risk of infection varies greatly with the type of contact.

One of the most effective ways to prevent transmission between patients is with single use or disposable devices. However, ultrasound transducers are complex and expensive devices that must be reused between patients. It is very important, therefore, to minimize the risk of disease transmission by using barriers and through proper processing between patients.

CAUTION

Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use.

CAUTION

To minimize the risk of infection from blood-borne pathogens, you must handle the probe and all disposables which have contacted blood, other potentially infectious materials, mucous membranes, and non-intact skin in accordance with infection control procedures. You must wear protective gloves when handling potentially infectious material. Use a face shield and gown if there is a risk of splashing or splatter.

## Using protective sheaths

Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern.

Always use a legally marketed, sterile probe sheaths for intra-cavitary and intra-operative procedures.

For neurological intra-operative procedures, use of a legally marketed, sterile, pyrogen free probe sheath is REQUIRED.

Devices containing latex may cause severe allergic reaction in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.

DO NOT use an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired.

Do not use pre-lubricated condoms as a sheath. In some cases, they may damage the probe. Lubricants in these condoms may not be compatible with probe construction.

**Instructions.** Custom made sheaths are available for each probe. Each probe sheath kit consists of a flexible sheath used to cover the probe and cable and elastic bands used to secure the sheath.

Sterile probe sheaths are supplied as part of biopsy kits for those probes intended for use in biopsy procedures. In addition to the sheath and elastic bands, there are associated accessories for performing a biopsy procedure which are included in the kit. Refer to the biopsy instructions for the specific probes in the Discussion section of this chapter for further information.

**Reordering.** To reorder sheaths, please contact your local distributor or the appropriate support resource.

## Handling precautions

WARNING

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

WARNING

Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
  - Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
  - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
  - Avoid temperatures above 60°C.

CAUTION

Probes for transvaginal and transrectal applications require special handling. Transvaginal/transrectal examinations and probe insertions should be performed only by personnel with adequate training.

## Mechanical hazards

A defective probe or excessive force can cause patient injury or probe damage:

- Observe depth markings and do not apply excessive force when inserting or manipulating intercavitary probes.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.
- DO NOT apply excessive force to the probe connector when inserting into the probe port.

## Electrical shock hazard

The probe is driven with electrical energy that can injure the patient or user if live internal parts are contacted by conductive solution:

- **DO NOT** immerse the probe into any liquid beyond the level indicated by the immersion level diagram. Refer to the immersion illustration in the Probe Cleaning Process section. Never immerse the probe connector or probe adaptors into any liquid.
- **DO NOT** drop the probes or subject them to other types of mechanical shock or impact. Degraded performance or damage such as cracks or chips in the housing may result.
- Prior to each use, visually inspect the probe lens and case area for cracks, cuts, tears, and other signs of physical damage. DO NOT use a probe which appears to be damaged until you verify functional and safe performance. You must perform a more thorough inspection, including the cable, strain relief, and connector, each time you clean the probe.
- **DO NOT** kink, tightly coil, or apply excessive force on the probe cable. Insulation failure may result.
- Electrical leakage checks should be performed on a routine basis by GE Service or qualified hospital personnel. Refer to the service manual for leakage check procedures.

# Care and Maintenance

## Planned maintenance

CAUTION

Improper handling can lead to early probe failure and electric shock hazards.

DO follow the specific cleaning and disinfection procedures provided in this chapter and the germicide manufacturers instructions.

Failure to do so will void probe warranty.

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety.

It is recommended to keep a maintenance log and note all probe malfunctions, along with a picture of any probe malfunction.

Table 17-3: Planned Maintenance Program

| Do the Following | Before Each Use | After Each Use | As Necessary |
|---|---|---|---|
| Inspect the Probes | X | X | X |
| Clean the Probes | | X | X |
| Disinfect Probes | | | X |

## Inspecting probes

CAUTION

If any damage is found, DO NOT use the probe until it has been inspected and released for further use by a GE service representative.

### Before each use

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.
2. Test the functionality of the probe.

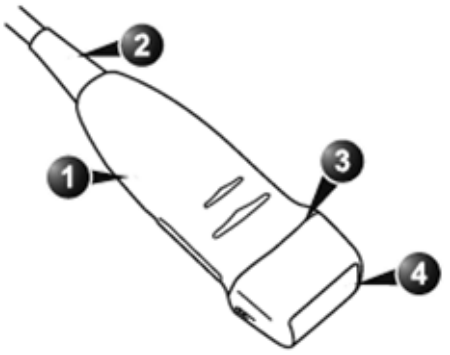



Figure 17-3. Probe parts

1. Housing
2. Strain relief
3. Seal
4. Lens

### After each use

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.
2. Look for any damage that would allow liquid to enter the probe.

## Cleaning and disinfecting probes

Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

Use only germicides that are listed in the Probe Care Card enclosed with the probe. In addition, refer to the local / national regulations.

Do not steam, heat autoclave on general surface probes.

You MUST disconnect the probe from the LOGIQ S7 Expert/ Pro prior to cleaning/disinfecting the probe. Failure to do so could damage the system.

Avoid cross-contamination, follow all infection control policies established by your office, department or hospital as they apply to personnel and equipment.

Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, seal, cable and connector. DO NOT use a transducer which appears damaged until functional and safe performance is verified. A thorough inspection should be conducted during the cleaning process.

Take extra care when handling the lens face of the ultrasound transducer. The lens face is especially sensitive and can easily be damaged by rough handling. NEVER use excessive force when cleaning the lens face.

## Cleaning and disinfecting probes (continued)

CAUTION

Probes for neuro surgical intra-operative use must NOT be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe. Neurological procedures must be done with the use of legally marketed, sterile, pyrogen free probe sheaths.

Biological Hazard

CREUTZFIELD-JACOB DISEASE

Neurological use on patients with this disease must be avoided. If a probe becomes contaminated, there is no adequate disinfecting means.

## Probe Cleaning Process

To clean the probe:

*NOTE: Do not immerse the probe into any liquid beyond the level specified for that probe (See 'Immersion Level' on page 17-21 for more information.). Never immerse the transducer connector into any liquid.*

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.
2. Disconnect the probe from the ultrasound console and remove all coupling gel from the probe by wiping with a soft cloth and rinsing with flowing water.

*NOTE: DO NOT wipe the probe with a dry cloth.*

3. Soak the probe head in water. Scrub the probe as needed using a soft sponge, gauze, or cloth to remove all visible residue from the probe surface.
4. Rinse the probe with enough clean potable water.
5. Air dry or dry with a soft cloth.
6. After cleaning, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

## Disinfecting probes

In order to provide users with options in choosing a germicide, GE Healthcare routinely reviews new medical germicides for compatibility with the materials used in the transducer housing, cable and lens. Although a necessary step in protecting patients and employees from disease transmission, liquid chemical germicides must also be selected to minimize potential damage to the transducer.

Refer to the Probe Care Card enclosed in the probe case or to http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html for the latest list of compatible cleaning solutions and disinfectants.

Table 17-4: Description of Pictogram on Care card

| Pictogram | Description |
|---|---|
| | “ATTENTION” - Consult accompanying documents” is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label. |
| | “CAUTION” - Dangerous voltage” (the lightning flash with arrowhead) is used to indicate electric shock hazards. |
| | Biohazard - Patient/user infection due to contaminated equipment.<br>Usage<br>• Cleaning and care instructions<br>• Sheath and glove guidelines |
| | Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. |
| | Do not immerse the probe into any liquid beyond the level specified for that probe. Refer to the user manual of the ultrasound system. |

Table 17-4: Description of Pictogram on Care card (Continued)

| Pictogram | Description |
|---|---|
| | Since there is a possibility of having negative effects on the probe, observe the specified immersing time by the germicide manufacturer strictly. Do not immerse the probe in liquid chemical germicides more than the time prescribed in the care card. |

## Disinfecting probes (continued)

Use additional precautions (e.g. gloves and gown) when decontaminating an infected probe.

*NOTE: About the recommended disinfectant, review the probe care card that is packed with each probe.*

**Low-level disinfection**

1. After cleaning, the probe and cable may be wiped with a tissue sprayed with a recommended disinfectant.

*NOTE: In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.*

2. After disinfecting, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

*NOTE: See ‘Probe Cleaning’ on page 18-21 for more information.*

## Disinfecting probes (continued)

**High-level disinfection**

High-level Disinfection destroys vegetative bacteria; lipid & non-lipid viruses, fungi and, depending highly on time of contact, is effective on bacterial spores.

1. Prepare the germicide solution according to the manufacturer's instructions. Be sure to follow all precautions for storage, use and disposal.

*NOTE: In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.*

2. Place the cleaned and dried probe in contact with the germicide for the time specified by the germicide manufacturer. High-level disinfection is recommended for surface probes and is required for endocavitary and intraoperative probes (follow the germicide manufacturer's recommended time).

*NOTE: DO NOT soak probes in liquid chemical germicide for longer than is stated by the germicide instructions for use. Extended soaking may cause probe damage and early failure of the enclosure, resulting in possible electric shock hazard.*

3. Rinse the part of the probe which was in contact with the germicide according to the germicide manufacturer's instructions. Flush all visible germicide residue from the probe and allow to air dry.

*NOTE: Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector into any liquid.*

4. After disinfecting, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

## Immersion Level

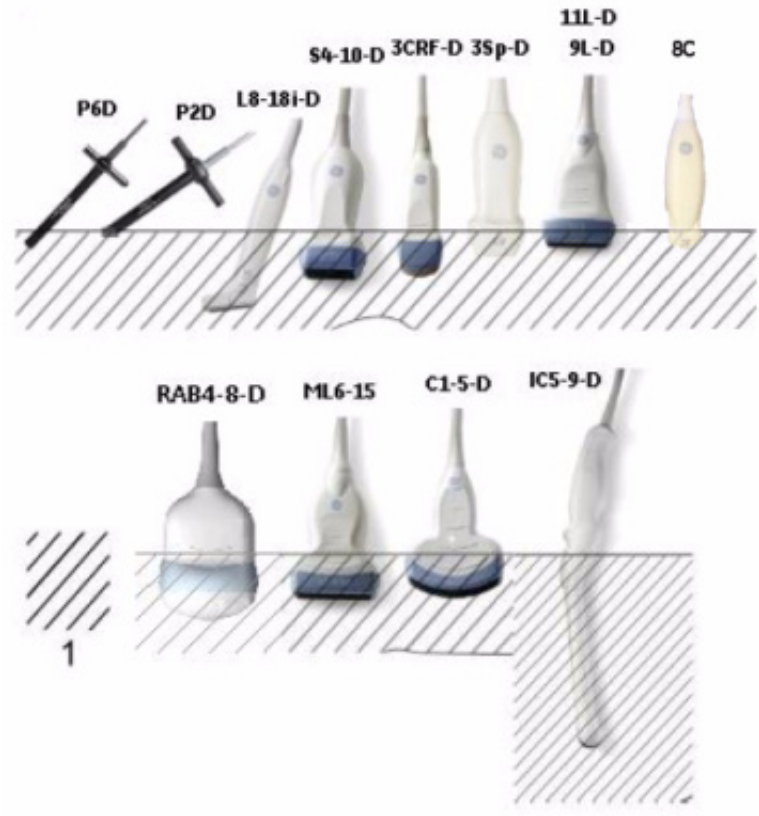



Figure 17-4. Probe Immersion Levels

1. Fluid Level

## Coupling gels

Do not use unrecommended gels (lubricants). They may damage the probe and void the warranty.

About the recommended gel, review the probe care card that is packed with each probe.

### Applying

In order to assure optimal transmission of energy between the patient and probe, a conductive gel or couplant must be applied liberally to the patient where scanning will be performed.

Do not apply gel to the eyes. If there is gel contact to the eye, flush eye thoroughly with water.

### Precautions

Coupling gels should not contain the following ingredients as they are known to cause probe damage:

- Methanol, ethanol, isopropanol, or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe Vera
- Olive Oil
- Methyl or Ethyl Parabens (para hydroxybenzoic acid)
- Dimethylsilicone
- Polyether glycol based

## Returning/Shipping Probes and Repair Parts

US Department of Transportation and GE Medical Systems policy requires that equipment returned for service MUST be clean and free of blood and other infectious substances.

When you return a probe or part for service (Field Engineer or customer), you need to clean and disinfect the probe or part prior to packing and shipping the equipment.

Ensure that you follow probe cleaning and disinfection instructions provided in the Basic User Manual.

This ensures that employees in the transportation industry as well as the people who receive the package are protected from any risk.

# Biopsy Special Concerns

## Precautions Concerning the Use of Biopsy Procedures

WARNING

Do not freeze the image during a biopsy procedure. The image must be live to avoid a positioning error.

Biopsy guidezones are intended to assist the user in determining optimal probe placement and approximate the needle path. However, actual needle movement is likely to deviate from the guideline. Always monitor the relative positions of the biopsy needle and the subject mass during the procedure.

WARNING

NEVER reuse the TR5° disposable biopsy guide attachment and Disposable sterile Ultra-Pro IITM Needle guide kits.

CAUTION

The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.

## Precautions Concerning the Use of Biopsy Procedures (continued)

CAUTION

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

- Follow the probe cleaning and disinfection procedures and precautions to properly prepare the probe.
- Follow the manufacturer's instructions for the cleaning of biopsy devices and accessories.
- Use protective barriers such as gloves and probe sheaths.
- After use, follow proper procedures for decontamination, cleaning, and waste disposal.

CAUTION

Improper cleaning methods and the use of certain cleaning and disinfecting agents can cause damage to the plastic components that will degrade imaging performance or increase the risk of electric shock.

See ‘Probe Safety’ on *page 17-8 for more information.*

# Preparing for a Biopsy

## Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode touch panel.

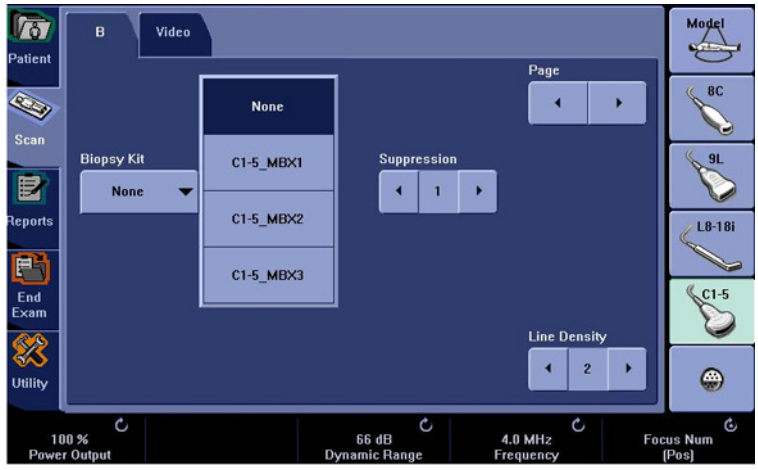



Figure 17-5. B-Mode touch panel menu

The available biopsy options appear when Biopsy Kit is selected. There are fixed and adjustable angle biopsy kits available with the LOGIQ S7 Expert/Pro depending on the probe. Select the desired biopsy kit.

*NOTE: You can display the biopsy guideline on the CFM image in simultaneous mode. Select the Show Biopsy Mark on CFM simultaneous Mode preset in the Utility -> System -> System Image -> Biopsy Guide screen.*

## Displaying the Guidezone (continued)

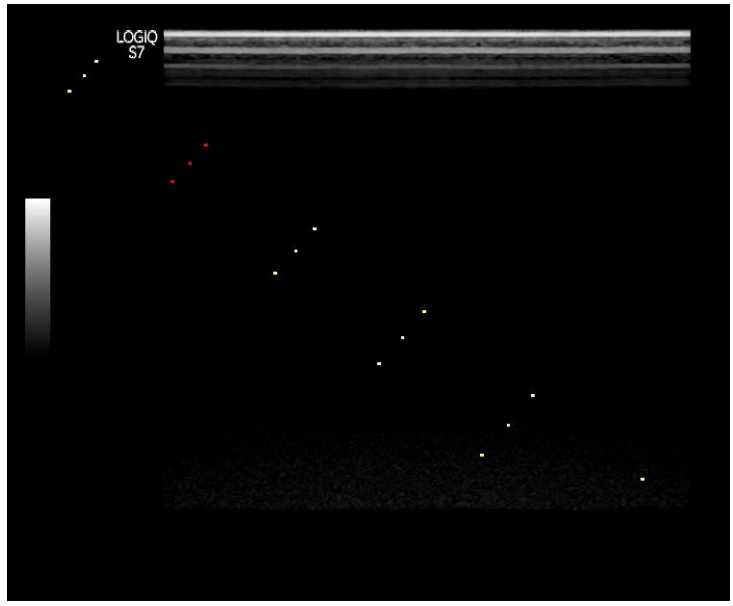



Figure 17-6. Biopsy Guidezone display (example)

The biopsy guidezone represents a path of the needle. The dots which make up the guidezones is the depth readout where:

- Yellow represent 1 cm increments.
- Red represents 5 cm increments.

The display should be carefully monitored during a biopsy for any needle deviation from the center line or guidezone.

## Displaying the Guidezone (continued)

The Biopsy Guidezone adjusts along with image adjustments, such as image inversion/rotations, zoom and depth changes.

*NOTE: To set up biopsy guidezones, refer to Table 16-9 for more details.*

The needle may vary from the center line or guidezone for various reasons:

- Needle barrel to needle clearance or strength.
- Bracket manufacturing tolerance.
- Needle deflection due to tissue resistance.
- Needle size chosen. Thinner needles may deflect more.

Failure to match the guidezone displayed to the guide may cause the needle to track a path outside the zone.

It is extremely important that when using the adjustable angle biopsy guides, the angle displayed on the screen matches the angle set on the guide, otherwise the needle will not follow the displayed guidezone which could result in repeated biopsies or patient injury.

## Preparing the Biopsy Guide Attachment

Convex, Sector and Linear probes have optional biopsy guide attachments for each probe.

The disposable needle barrels are available for a variety of needle sizes.

WARNING

DO NOT attempt to use the biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.

Table 17-5: Biopsy Guide Attachments

| Probe | Attachment | Attachment with Probe |
|---|---|---|
| C1-5-D | | |
| 9L-D | | |
| ML6-15 | | |

Table 17-5: Biopsy Guide Attachments (Continued)

| Probe | Attachment | Attachment with Probe |
|---|---|---|
| IC5-9-D with TR5 | | |
| IC5-9-D with reusable | | |
| 3CRF-D - Single angle | | |
| 3CRF-D - Multi-angle | | |
| 3Sp-D | | |

Table 17-5: Biopsy Guide Attachments (Continued)

| Probe | Attachment | Attachment with Probe |
|---|---|---|
| 11L-D | | |
| RAB4-8-D with PEC74 | | |
| RAB4-8-D Single Angle | | |
| IC5-9-D with TR5 | | |

### 3CRF-D Fixed Needle Biopsy Guide Assembly

1. Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

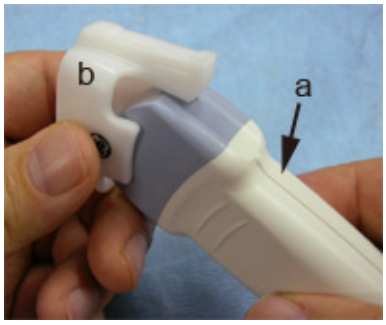



Figure 17-7. 3CRF-D Fixed needle biopsy bracket

2. Push both sides of the bracket with right and left thumb until it locks in place. Make sure the bracket is fastened.

Figure 17-8. Push both sides

CAUTION

Prevent damage to the probe lens with finger nails.

3. Place an adequate amount of coupling gel on the face of the probe.

### 3CRF-D Fixed Needle Biopsy Guide Assembly (continued)

4. Place the proper sanitary sheath over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

Figure 17-9. Applying Sanitary Sheath

5. Snap the needle guide onto the biopsy guide bracket.

Figure 17-10. Needle Guide

6. Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket.

Figure 17-11. Lock the Needle Guide

### 3CRF-D Fixed Needle Biopsy Guide Assembly (continued)

7. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

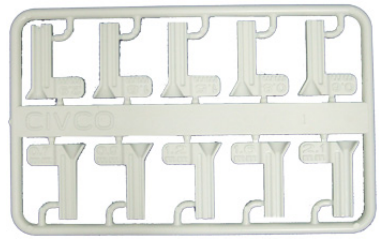


Figure 17-12. Needle Barrel

8. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

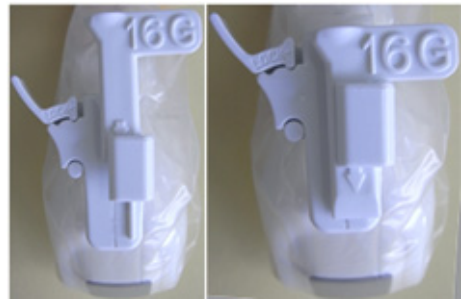



Figure 17-13. Needle Barrel Installation

## 3CRF-D Fixed Needle Biopsy Guide Assembly (continued)

### Remove the biopsy guide

1. Hold the biopsy guide and push out the needle clip attachment. See Figure 17-14.

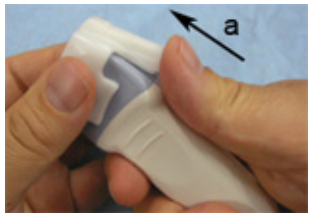



Figure 17-14. Remove the biopsy guide

a. Push out

CAUTION

Prevent damage to the probe lens with finger nails.

## Multi Angle Biopsy Guide Assembly

1. Scan the patient and identify the target for biopsy. Move the probe to locate the target to the center of the image. Enable the system biopsy guidezone and try guidezone angles MBX1 to MBX3 to decide the best angle setting for needle path.

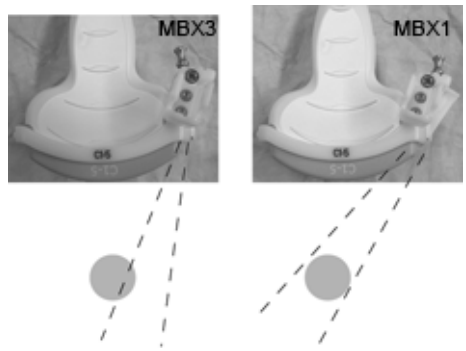



Figure 17-15. Example

2. Pull up on the knob (Figure 17-16 a) to freely move the needle guide attachment. Align the knob with the selected position of the needle guide attachment.

   Push the knob down (Figure 17-16 b) into the desired slot to secure the angle position of the needle guide attachment.

Figure 17-16. Pull up and push down the knob

## Multi Angle Biopsy Guide Assembly (continued)

3. Fit a convex of the biopsy bracket (a) in a concave of the probe (b).

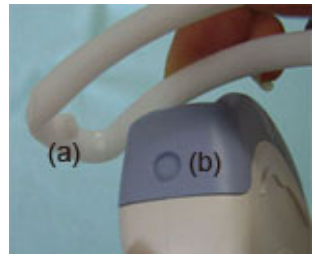



Figure 17-17. Probe/Bracket Alignment

Hold the side (a) and tuck down the needle guide side (b) until it clicks or locks in place.

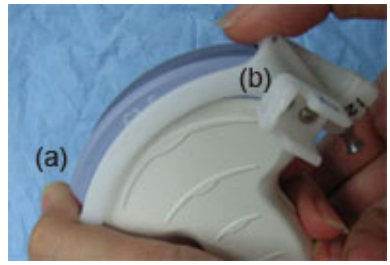



Figure 17-18. Probe/Multi-angle Bracket Alignment 2

4. Place an adequate amount of coupling gel on the face of the probe.

## Multi Angle Biopsy Guide Assembly (continued)

5. Place the proper sanitary sheath tightly over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

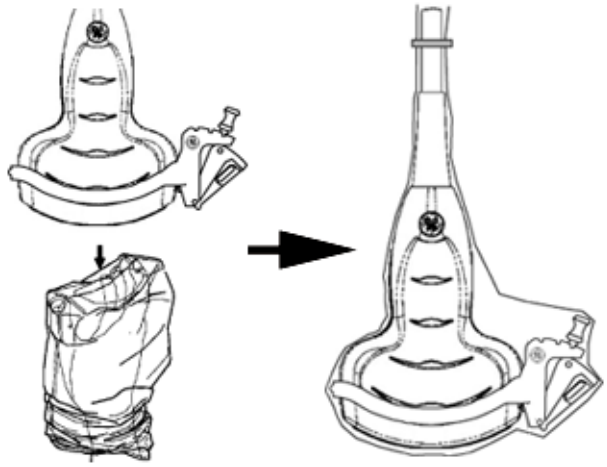


Figure 17-19. Applying Sanitary Sheath

6. Snap the needle guide onto the biopsy guide bracket.

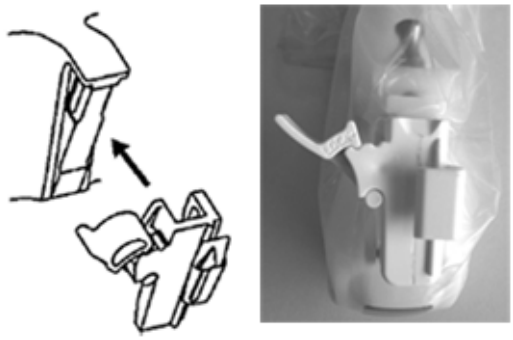


Figure 17-20. Snap the needle guide

## Multi Angle Biopsy Guide Assembly (continued)

7. Push the locking mechanism towards the bracket to secure the lock (a). Make sure the needle guide is firmly attached to the bracket.

Figure 17-21. Lock the Needle guide

8. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

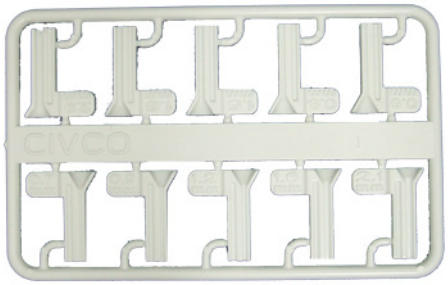



Figure 17-22. Needle Barrel

9. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

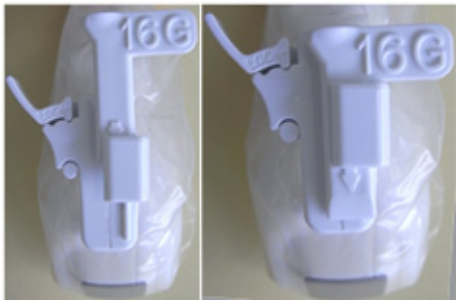



Figure 17-23. Needle Barrel Installation

## Multi Angle Biopsy Guide Assembly (continued)

### Remove the biopsy guide

1. Hold the other side and push out the needle clip attachment side. See Figure 17-24.

Figure 17-24. Remove the biopsy guide

CAUTION

Prevent damage to the probe lens with finger nails.

## Releasing the needle

According to the following procedure, you remove the needle from a probe and an assembly without moving the needle.

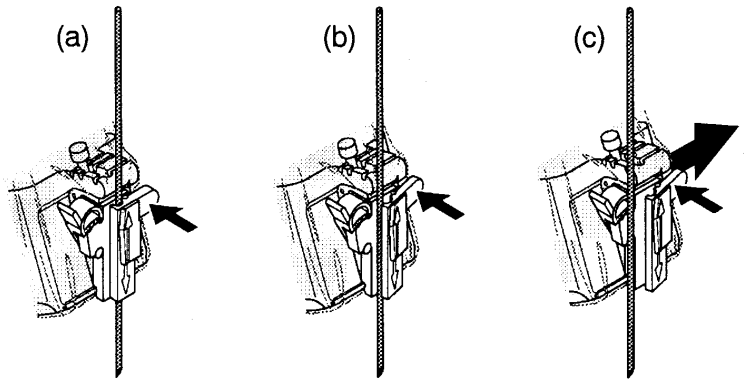



Figure 17-25. Release the needle from assembly

a. Push the knob portion of a sleeve in the direction of the arrow.
b. The needle is released from the assembly.
c. Push the probe and the assembly in the direction of the larger arrow to remove the needle.

### 3CRF-D Multi-Angle Biopsy Guide Assembly

1. Select the appropriate needle pad and attach it on the biopsy guide.
2. Place an adequate amount of coupling gel on the face of the probe.
3. Place the proper sanitary sheath over the probe. Use the rubber bands supplied to hold the sheath in place.

Figure 17-26. 3CRF-D with probe sheath

4. Orient the bracket so that the needle pad will be on the same side as the probe orientation mark (ridge).

Figure 17-27. Multi-Angle Biopsy Guide

a. Probe Orientation Mark
b. Needle pad

### 3CRF-D Multi-Angle Biopsy Guide Assembly (continued)

5. Tighten up a screw to fix a biopsy guide.

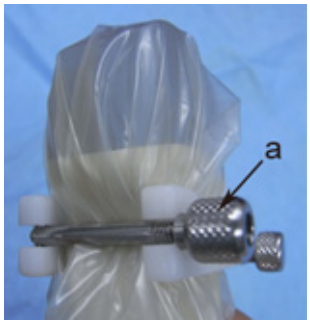



Figure 17-28. Tighten up a screw

a. Screw

CAUTION

Ensure that all guide parts are seated properly prior to performing a biopsy.

6. Insert the biopsy needle from Angle 1 or Angle 2.

Figure 17-29. Angles

## 3CRF-D Multi-Angle Biopsy Guide Assembly (continued)

### Remove the biopsy needle

1. Press and hold the quick release screw.

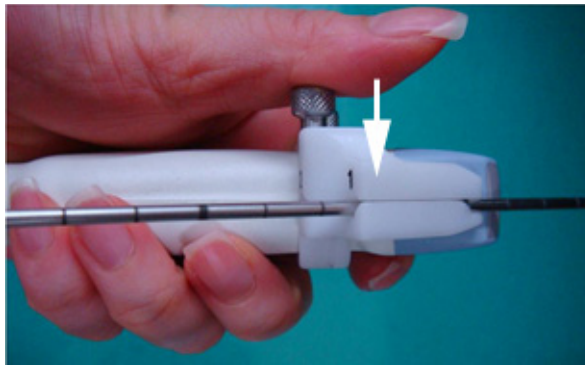


Figure 17-30. Quick release screw

2. Slide the probe to remove the needle.

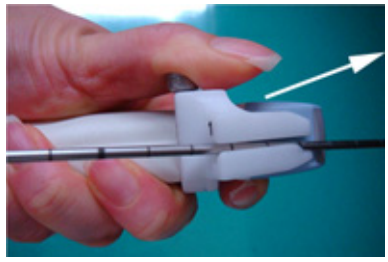


Figure 17-31. Slide the probe

## Endocavitary Probe Biopsy Guide Assembly - Representative Example

**WARNING** **DO NOT** use the needle with the catheter (soft tube). There is a possibility of breaking the catheter in the body.

**CAUTION** Patient injury or repeated biopsies may result. The needle placement will not be as intended if the needle guide is not properly seated and secure.

**CAUTION** Before inserting the needle, scan the patient to determine the correct puncture depth and site. Only the sterile/sanitary sheath and rubber band are on the probe during the pre-needle placement scanning.

### Preparation

To prepare the endocavitary probe for use:

1. Remove the probe from the box and carefully examine it for any damage.
2. If the biopsy guide is to be attached, use the filling removal tool to clean out the attachment area on the probe head.

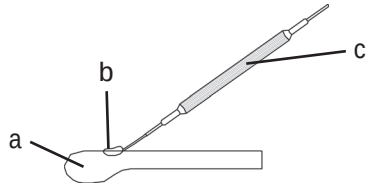



Figure 17-32. Attachment Filling Removal

a. Probe Head
b. Attachment
c. Filling Removal Tool

3. Clean, then disinfect the probe.

*NOTE: Ensure that protective gloves are worn.*

### Installing the sheath

To install the sheath:

1. Remove the sheath from its package. Do not unroll the sheath.

*NOTE: Remember to rinse all sanitary probe sheaths of powder before placing on the probe. Powder can degrade the displayed image.*

2. Place an adequate amount of ultrasound gel inside the sheath tip (the gel is between the sheath inner surface and the probe aperture).

*NOTE: Ensure that only acoustic coupling gel is used for this purpose.*

3. Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.
4. Inspect the sheath for nicks, cuts or tears.

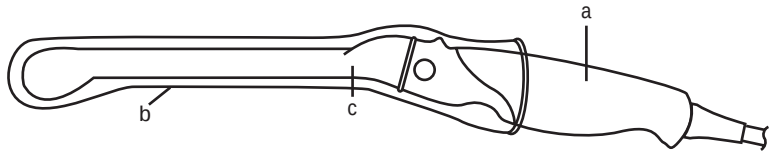



Figure 17-33. Endocavitary Probe with Sheath

a. Probe Handle
b. Sanitary Sheath
c. Probe Body

5. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.

**Endocavitary Probe Biopsy Guide Preparation**

1. If a biopsy is to be performed, snap the metal or plastic biopsy guide on to the probe over the sheath.

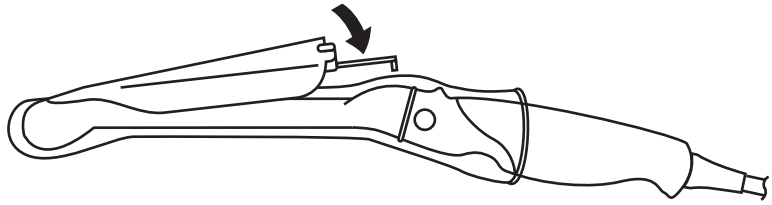


Figure 17-34. Disposable Biopsy Guide 5 degree Angle

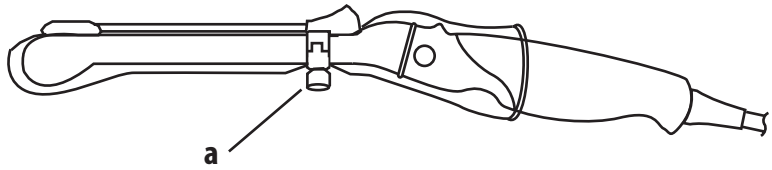



Figure 17-35. Reusable Biopsy Guide

a. Fix with a screw

*NOTE: For the IC5-9-D probe, use the TR5 guidelines for the plastic/disposable reusable biopsy guides; use the RU guidelines with the stainless steel reusable biopsy guides.*

2. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.
3. Ensure the guide is properly seated and secure by pushing forward on the needle insertion end of the guide until the attachment node is firmly in place in it's hole.

### Biopsy Needle Path Verification

To verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following:

1. Properly install the bracket and biopsy guide.
2. Scan in a container filled with water (47° C).
3. Display the biopsy guidezone on the monitor.
4. Ensure that the needle echo falls within the guidezone markers.

## The Biopsy Procedure

Biopsy procedures must only be performed on live images.

Ensure that all guide parts are seated properly prior to performing a biopsy.

1. Place coupling gel on the scanning surface of the probe/ sheath/biopsy guide assembly.
2. Activate the biopsy guidezone on the system through the B-Mode touch panel. When using multi-angle guides, ensure that the proper guidezone angle is displayed.
3. Scan to locate the target. Center the target in the electronic guidezone path.

*NOTE: Enabling color flow would allow for visualization of the vascular structure around the area to be biopsied.*

4. Place the needle in the guide between the needle barrel and needle clip. Direct it into the area of interest for specimen retrieval.

## Post Biopsy

When the biopsy is complete, remove the needle barrel, needle clip and probe sheath. Properly dispose of these items in accordance with current facility guidelines.

Clean and disinfect the probe. See ‘Probe Cleaning Process’ on *page 17-16 for more information.*

The biopsy bracket can be cleaned and disinfected in a recommended disinfecting agent and reused.

When the biopsy needle guide kit is opened, all parts must be discarded after the procedure whether they have been used or not.

# Surgery/Intra-operative Use

## Preparing for Surgery/Intra-operative Procedures

Preparing the transducer for intra-operative use follows the same sterile procedure as for biopsy use except that no biopsy attachments are used. See ‘Preparing the Biopsy Guide Attachment’ on *page 17-29 for more information.* Sterile gel is applied to the transducer face and a sterile sheath completely covers the transducer and cable which has first undergone a thorough cleaning and high-level disinfection.

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

CAUTION

For surgery/intra-operative procedures, a sterile environment is required. Therefore, both the operator and probe needs to be sterile.

## Preparing for Surgery/Intra-operative Procedures (continued)

To ensure a sterile environment during the procedure, it is recommended that this be a two-person job.

1. Perform a high level disinfection of the probe.
2. The scanner (surgeon, sonographer, etc.) should be sterile and gloved.
3. Place an adequate amount of sterile coupling gel on the face of the probe.
4. Place the proper sterile sheath over the probe and cord.

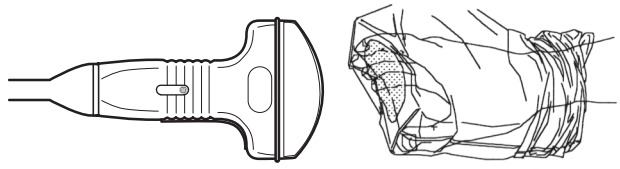


Figure 17-36. Applying Sterile Sheath

5. Depending on the type of procedure, use either sterile water or sterile gel on the sheath cover.

*NOTE: Follow your institutions guidelines on post surgery/ intra-operative procedures for probe cleaning and disinfection.*

# *Chapter 18*

# User Maintenance

*This chapter supplies system data, assistance information, and system care and maintenance instructions.*

# System Data

## Features/Specifications

Table 18-1: Physical Attributes

| | |
|---|---|
| Dimensions and Weight<br>• Height: 1,115mm (Minimum), 1,750mm (Max.)<br>• Width: 620mm (Caster), 500mm (Keyboard)<br>• Depth: 856mm (Max.), 790mm (Caster)<br>• Weight: 90 kg (198 lb.)<br><br>Console Design<br>• 4 active probe ports and 1 non imaging (CW pencil probe port)<br>• Integrated HDD<br>• Integrated DVD-RW Multi Drive<br>• On-board storage of thermal printer<br>• Integrated speakers<br>• Locking mechanism that provides rolling lock and caster swivel lock<br>• Integrated cable management<br>• Front and rear handles<br>• Gel holder<br>• Easily removable air filters<br><br>Electrical Power<br>• Voltage:100-120 Vac or 220-240 Vac<br>• Frequency: 50/60 Hz<br>• Power: Consumption maximum of 900 VA with peripherals<br>• Power cord: Type SJT, SJE, SJO or SJTO, 14AWG, 3-Conductor, VW-1, 125 V or 250 V, 10 A, max 3.0 m long; One end with Hospital Grade Type, NEMA 5-15P or 6-15P. Other end with appliance coupler. | Keyboard<br>• LOGIQ 7 Expert: Operating keyboard adjustable in two dimensions of Height and Rotation<br>• LOGIQ 7 Pro: Operating keyboard adjustable in Rotation<br>• Backlit alphanumeric keyboard<br>• Ergonomic hard key layout<br>• Interactive back-lighting<br>• Integrated recording keys for remote control of up to 6 peripheral or DICOM devices<br>• Integrated gel warmer for LOGIQ S7 Expert, option for LOGIQ S7 Pro<br><br>Touch panel<br>• Wide 7.0 in High Resolution, Color, Touch, LCD screen<br>• Interactive dynamic software menu<br>• Brightness adjustment<br>• User-configurable layout<br><br>19” LCD Monitor<br>• High-Resolution LCD display with DVI interface<br>• LCD translation (independent of console): 500 mm horizontal (end to end), 150 mm vertical (end to end), 90° Swivel<br>• Fold-down and lock mechanism for transportation<br>• Brightness & contrast adjustment<br>• Resolution: 1280 x 1024<br>• Horizontal/Vertical viewing angle of +/- 170° |

Table 18-2: System Overview

| | |
|---|---|
| Applications<br>• Abdominal<br>• Obstetrical<br>• Gynecological<br>• Breast<br>• Small Parts and superficial<br>• Musculoskeletal<br>• Vascular<br>• Urological<br>• Endocavitary<br>• Pediatric and Neonatal<br>• Transcranial<br>• Cardiac<br><br>Scanning Methods<br>• Electronic Sector<br>• Electronic Convex<br>• Electronic Linear<br>• Mechanical Volume Sweep<br><br>Operating Modes<br>• B-Mode<br>• M-Mode<br>• Color Flow (CFM)<br>• Power Doppler Imaging (PDI)<br>• PW Doppler<br>• CW Doppler<br>• Volume Mode (Easy 3D, Advanced 3D, 4D)<br>• Anatomical-M Mode<br>• Curved Anatomical M-Mode<br>• B-Flow/B-Flow Color (Option)<br>• Extended Field of View (LOGIQView, Option)<br>• TVI (Option)<br>• Coded Contrast Enhanced Ultrasound (Option)<br>• Elastography (Option) | Display Modes<br>• Simultaneous Capability [B or CrossXBeam/PW; B or CrossXBeam/CFM or PDI; B/M; Real-time Triplex Mode (B or CrossXBeam + CFM or PDI/PW); B/CW (option)]<br>• Selectable alternating Modes [B/M / M; B or CrossXBeam/PW; B or CrossXBeam + CFM (PDI)/PW; B/CW (option)]<br>• Colorized Image - Colorized B - Colorized M - Colorized D<br>• Time line Display [Independent Dual B or CrossXBeam/PW Display; CW Display; 2 Display Formats; Top/Bottom or Side/Side selectable Format; Size: 1/3: 1/2: 2/3; 1/2: 1/4 (full format, switchable after freeze); 2 Timeline Methods: Scrolling or Moving Bar<br>• Virtual Convex<br>• Multi Image Split/Quad Screen [Live and/or Frozen, B or CrossXBeam+B or CrossXBeam/CFM or PDI, PW/M, Independent Cine playback]<br>• Zoom: Write/Read/Pan<br><br>Transducer Types<br>• Sector Phased Array<br>• Linear Array<br>• Convex Array<br>• Micro convex Array<br>• Matrix Array<br>• Split Crystal |

Table 18-2: System Overview (Continued)

| Standard Features | Options |
|---|---|
| • Advanced user interface with high resolution 7 inch wide LCD touch screen<br>• Automatic Optimization<br>• CrossXBeam<br>• Speckle Reduction Imaging (SRI-HD)<br>• Fine Angle Steer<br>• Coded Harmonic Imaging<br>• Virtual Convex<br>• Patient information database<br>• Image Archive integrated on CD/DVD and Hard Drive<br>• Real-time automatic Doppler calcs<br>• OB Calcs<br>• Fetal Trending<br>• Multi gestational Calcs<br>• Hip Dysplasia Calcs<br>• Gynecological Calcs<br>• Vascular Calcs<br>• Urological Calcs<br>• Renal Calcs<br>• Cardiac Calcs<br>• inSite ExC Capability<br>• On-board electronic documentation | • Advanced 3D<br>• B-Flow<br>• Auto IMT<br>• Flow Quantification<br>• Stress Echo<br>• LOGIQView<br>• Coded Contrast Enhanced Ultrasound<br>• Scan Assistant<br>• DICOM 3.0 connectivity<br>• Report Writer<br>• CW Doppler<br>• Tissue Velocity Imaging (TVI)<br>• Elastography<br>• Elasto Quantification<br><br>Peripheral Options<br>• Integrated options for<br>  • Digital B/W Printer<br>  • DVD Video Recorder<br>  • Digital color thermal printer<br>• Digital A6 color thermal printer<br>• External USB Printer connections<br>• HDMI output available for compatible devices<br>• Footswitch with programmable functionality |

Table 18-3: System Parameters

Controls Available on Freeze or Recall
- Automatic Optimization
- SRI-HD
- CrossXBeam - Display non-compounded and compounded image simultaneously in split screen
- 3D reconstruction from a stored CINE loop
- B/M/CrossXBeam Mode (Gray Map; TGC, Colorized B and M; Frame Average [Loops only]; Dynamic Range)
- Anatomical M-Mode
- Max Read Zoom to 8x
- Base Line Shift
- Sweep Speed
- PW-Mode (Gray Map; Post Gain; Baseline Shift; Sweep Speed; Invert Spectral Waveform; Compression; Rejection, Colorized Spectrum; Display Format; Doppler Audio; Angle Correct; Quick Angle Correct, Auto Angle Correct)
- Color Flow (Overall Gain [Loops and Stills]; Color Map; Transparency Map; Frame Averaging [Loops only]; Flash Suppression, CFM Display Threshold; Spectral Invert for Color/Doppler)
- Anatomical M-Mode on CINE Loop

Controls Available While “Live”
- Write zoom
- B/M-Mode (Gain; TGC; Dynamic Range; Acoustic Output; Transmission Focus Position; Transmission Focus Number; Line Density Control; Sweep Speed for M-Mode; # of Angles for CrossXBeam)
- PW-Mode (Gain; Dynamic Range; Acoustic Output; Transmission Frequency; PRF; Wall Filter; Spectral Averaging; Sample Volume Gate for PW-Mode Length and Depth; Velocity Scale)
- Color Flow (CFM Gain; CFM Velocity Range; Acoustic Output; Wall Echo Filter; Packet Size; Frame Rate Control; CFM Spatial Filter; CFM Frame Averaging; CFM Line Resolution; Frequency/Velocity Baseline Shift)

Scanning Parameters
- Displayed Imaging Depth: 0 - 33 cm
- Minimum Depth of Field: 0 - 2 cm (Zoom) (probe dependent)
- Maximum Depth of Field: 0 - 33 cm (probe dependent)
- Continuous Dynamic Receive Focus / Continuous Dynamic Receive Aperture
- Adjustable Dynamic Range
- Adjustable Field of View [FOV]
- Image Reverse: Right/ Left
- Image Rotation: 0°, 180°

Image Storage
- On-board database of patient information from past exams
- Storage Formats:
  - DICOM - compressed/ uncompressed, single/ multiframe, with/ without Raw Data
  - Export JPEG,JPEG2000, WMV (MPEG 4), and AVI formats
- Storage Devices:
  - USB Flash Device: 64MB to 4GB (for exporting individual images/clips)
  - CD-RW storage: 700MB
  - DVD storage: -R (4.7GB)
  - Hard Drive Image Storage: ~112GB
- Compare old images with current exam
- Reload of archived data sets

CINE Memory/Image Memory
- 384 MB of CINE Memory
- Selectable CINE Sequence for CINE Review
- Prospective CINE Mark
- Measurements/Calculations & Annotations on CINE Playback
- Scrolling timeline memory
- Dual Image CINE Display
- Quad Image CINE Display
- CINE Gauge and CINE Image Number Display
- CINE Review Loop
- CINE Review Speed

Table 18-4: Measurements and Calculations

| | |
|---|---|
| B-Mode<br>• Depth and Distance<br>• Circumference and Area (Ellipse/Trace)<br>• Volume (Ellipsoid)<br>• Angle between 2 Lines<br>• % Stenosis (Area or Diameter)<br><br>M-Mode<br>• M Depth and Distance<br>• Time<br>• Slope<br>• Heart Rate<br><br>Doppler Measurements/Calculations<br>• Velocity<br>• Time<br>• A/B Ratio (Velocities/Frequency Ratio)<br>• PS (Peak Systole)<br>• ED (End Diastole)<br>• PS/ED (PS/ED Ratio)<br>• ED/PS (ED/PS Ratio)<br>• AT (Acceleration Time)<br>• Accel (Acceleration)<br>• TAMAX (Time Averaged Maximum Velocity)<br>• Volume Flow [TAMEAN and Vessel Area]<br>• Heart Rate<br>• PI (Pulsatility Index)<br>• RI (Resistivity Index)<br><br>Vascular Measurements/Calculations<br>• Carotid, Vertebral, Subclavian Measurements, Auto IMT<br>• Summary Reports | Obstetrics Measurements/Calculations<br>• Gestational Age Calculation<br>• EFW Calculation<br>• Calculations and Ratios<br>• Measurements/Calculations<br>• Fetal Graphical Trending<br>• Growth Percentiles<br>• Multi-Gestational Calculation<br>• Fetal Qualitative Description (Anatomical Survey)<br>• Fetal Environmental Description (Biophysical profile)<br>• Programmable OB Tables<br>• Over 20 selectable OB Calcs<br>• Expanded Worksheets<br><br>Gynecology Measurements/Calculations<br>• Right/Left Ovary Length, Width, Height<br>• Uterus Length, Width, Height<br>• Cervix Length, Trace<br>• Ovarian Volume<br>• ENDO (Endometrial thickness)<br>• Ovarian/Uterine RI<br>• Summary Report<br><br>Urology Calculation<br>• Bladder, Prostate, Renal, Generic Volume Measurements<br>• Post-Void Bladder Volume<br><br>Cardiology Measurements/Calculations<br>• Cardiology Measurements and Calculations<br>• Summary Worksheet<br>• Summary Report |

Table 18-5: Probes

| | |
|---|---|
| • C1-5D (Applications: Abdomen, Vascular, OB/GYN, Urology)<br>• 9L-D (Applications: Abdomen, Small Parts, Vascular, Pediatric)<br>• IC5-9-D (Applications: OB/GYN, Urology, Transvaginal, Transrectal)<br>• 3CRF-D Convex Probe (Applications: Abdomen, OB/GYN, Urology)<br>• L8-18i-D (Applications: Small Pars, Vascular, Neonatal, Pediatrics)<br>• ML6-15* (Applications: Small Pars, Vascular, Pediatrics, Neonata)<br>• S4-10-D* (Applications: Pediatrics, Neonatal, Abdomen) | • P2D CW Split Crystal Probe(Applications: Cardiac, Vascular)<br>• P6D CW Split Crystal Probe(Applications: Cardiac, Vascular)<br>• RAB4-8-D (Applications: Abdomen, OB/GYN, Urology))<br>• 11L-D (Applications: Small Parts, Vascular, Pediatric, Neonatal)<br>• 3Sp-D (Applications: Cardiac, Abdomen, Transcranial)<br>• 8C Wide Band Microconvex Probe (Applications: Pediatric, Neonatal) |
| * LOGIQ S7 Expert Only | |

Table 18-6: Biopsy Guides

| | |
|---|---|
| • Single-Angle, disposable with a reusable bracket<br>• Multi-Angle, disposable with a reusable bracket | • Single-Angle, disposable with a disposable bracket |

Table 18-7: Inputs and Outputs Signal

| | |
|---|---|
| • USB 2.0 x 3 ports<br>• HDMI connector | • Ethernet 1000/100/10BaseT<br>• Audio Line Out (1.5mm pin jack) |

## Clinical Measurement Accuracy

### Basic Measurements

The following information is intended to provide guidance to the user in determining the amount of variation or measurement error that should be considered when performing clinical measurements with this equipment. Error can be contributed by equipment limitations and improper user technique. Be sure to follow all measurement instructions and develop uniform measurement techniques among all users to minimize the potential operator error. Also, in order to detect possible equipment malfunctions that could affect measurement accuracy, a quality assurance (QA) plan should be established for the equipment that includes routine accuracy checks with tissue mimicking phantoms.

Please be advised that all distance and Doppler related measurements through tissue are dependent upon the propagation velocity of sound within the tissue. The propagation velocity usually varies with the type of tissue, but an average velocity for soft tissue is assumed. This equipment is designed for, and the accuracy statements listed on are based on, an assumed average velocity of 1540 m/s. The percent accuracy when stated applies to the measurement obtained (not the full scale range). Where the accuracy is stated as a percent with a fixed value, the expected inaccuracy is the greater of the two.

## Basic Measurements (continued)

Table 18-8: System Measurements and Accuracies

| Measurement | Units | Useful Range | Accuracy | Limitations or Conditions |
|---|---|---|---|---|
| Depth | mm | Full Screen | ±max (5% or 1 mm) | |
| Angle | degree | Full Screen | ±max (10% or 1deg) | |
| Distance: | | | | |
| Axial | mm | Full Screen | ±max (5% or 1 mm) | |
| Lateral | mm | Full Screen | ±max (5% or 2 mm) | Linear Probes |
| Lateral | mm | Full Screen | ±max (5% or 4 mm) | Convex Probes |
| Lateral | mm | Full Screen | ±max (5% or 4 mm) | Sector Probes |
| Circumference: | | | | |
| Trace | mm | Full Screen | ±max (10% or 1 mm) | |
| Ellipse | mm | Full Screen | ±max (5% or 1 mm) | |
| Area: | | | | |
| Trace | $mm^2$ | Full Screen | ±max (5% or 1 $mm^{2)}$ | |
| Ellipse | $mm^2$ | Full Screen | ±max (5% or 1 $mm^{2)}$ | |
| 3D Volume Accuracy | | | ±10% | |
| Time | s | Timeline Display | ±max (5% or 10 ms) | M mode, PWD mode, CWD mode, TVD mode |
| Slope | mm/s | Timeline Display | ±max (5% or 1 mm/s) | M-Mode |
| Doppler SV Position | mm | Full Screen | ±2 mm | PWD mode, TVD mode |
| Velocity | cm/s | | ±max (10% or 1cm/s) | PWD mode, CWD mode, TVD mode |

Table 18-8: System Measurements and Accuracies (Continued)

| Measurement | Units | Useful Range | Accuracy | Limitations or Conditions |
|---|---|---|---|---|
| Doppler Angle Correction | cm/s | From 0-60°<br>From 60-80° | ±max (5% or 1deg)<br>±12% | PWD mode, CWD mode, TVD mode |

## Clinical Calculation Accuracy

Estimate the overall inaccuracy of a combined measurement and calculation by including the stated inaccuracy from the basic measurement accuracy statements.

Diagnostic errors may result from the inappropriate use of clinical calculations. Review the referenced source of the stated formula or method to become familiar with the intended uses and possible limitations of the calculation.

Calculation formulas and databases are provided as a tool to assist the user, but should not be considered an undisputed database, in making a clinical diagnosis. The user is encouraged to research the literature and judge the equipment capabilities on an ongoing basis in order to assess its utility as a clinical tool.

# Anti-Virus Software Note

Anti-virus software IS NOT present on the LOGIQ S7 Expert/Pro system. Since the LOGIQ S7 Expert/Pro is already protected against attack by the measures listed below, no Anti-virus software is deemed necessary.

- Only communication ports required for system operation are enabled.
- Only operating system services required by system application software are enabled.
- Software programs CANNOT be loaded onto the LOGIQ S7 Expert/Pro (e.g., email, web browser, etc.).
- An auto-executable file CANNOT be run automatically on the LOGIQ S7 Expert/Pro.
- The LOGIQ S7 Expert/Pro software includes the latest MS Windows security protection.
- Prior to release, the LOGIQ S7 Expert/Pro is tested using the same tools as the United States Department of Defense and Hospital IT organizations.

Due to the safety measures noted above, and the security standards of Windows XP Service Pack 3, the highest safety against viruses, worms, etc., has been provided to ensure sufficient safety measures. In addition, additional security information can be found at http://www.gehealthcare.com/usen/security/index.html.

# System Care and Maintenance

## Overview

The user must ensure that safety inspections are performed at least every 12 months according to the requirements of the patient safety standard IEC 60601-1 (1988). Refer to the Service manual, Chapter 10.

Only trained persons are allowed to perform the safety inspections mentioned above.

Technical descriptions are available on request.

To ensure that the unit constantly operates at maximum efficiency we recommend that the following procedures be observed as part of the customer's internal routine maintenance program.

Contact the local Service Representative for parts or periodic maintenance inspections.

## Expected Service Life Description

The expected service life for the LOGIQ S7 Expert/Pro system and probes is identified in this table:

Table 18-9: Expected Service Life

| Equipment / Accessory | Expected Service Life |
|---|---|
| LOGIQ S7 Expert/Pro system | The expected service life for the LOGIQ S7 Expert/Pro is at least seven (7) years from the manufacturing date under the provision of regular maintenance by authorized service personnel. |
| LOGIQ S7 Expert/Pro Probes | The expected service life for the LOGIQ S7 Expert/Pro probes meets or exceeds five (5) years from the date the probe is placed in service, under the provision that the customer follows the care instructions provided on the Probe Care Card / Accompanying LOGIQ S7 Expert/ Pro Instructions for Use. |

## Inspecting the System

To avoid electrical shock hazard, do not remove panels or covers from console. This servicing must be performed by qualified service personnel. Failure to do so could cause serious injury.

### Monthly Maintenance

Examine the following on a monthly basis (or whenever there is a reason to assume that any issue may have occurred):

- Connectors on cables for any mechanical defects.
- Entire length of electrical and power cables for cuts or abrasions.
- Equipment for loose or missing hardware.
- Control panel and keyboard for defects.
- Casters for proper locking operation.
- Trackball movement

  If the trackball is dusty, please clean it. See ‘Trackball’ on *page 18-18 for more information.*

## Weekly Maintenance

The system requires weekly care and maintenance to function safely and properly. Clean the following:

- System Cabinet
- LCD Monitor
- Operator control panel
- touch panel
- Probe holder

  If the probe holder is dusty, please clean it. See ‘Probe holder’ on *page 18-19 for more information.*
- Gel warmer

  If the gel warmer is dusty, please clean it. See ‘Gel warmer’ on *page 18-19 for more information.*
- Footswitch
- Air filter

  If the air filter is dusty, please clean it. See ‘Cleaning the air filter’ on *page 18-20 for more information.*

*NOTE: Frequency of the cleaning is depend on environment.*

Failure to perform required maintenance may result in unnecessary service calls.

## Cleaning the system

Prior to cleaning any part of the system:

1. Turn off the system power. If possible, disconnect the power cord. See ‘Power Off’ on *page 3-21 for more information.*

### System Cabinet

To clean the system cabinet:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe down the top, front, back, and both sides of the system cabinet.

*NOTE: Do not spray any liquid directly into the unit.*

### LCD Monitor and touch panel

*NOTE: Never use thinner, benzene, alcohol (ethanol or methanol), abrasive cleaners, or other strong solvents, as these may cause damage to the cabinet or LCD panel.*

*NOTE: DO NOT scratch or press on the panel with any sharp objects, such as pencils or pens, as this may result in damage to the panel.*

To clean the LCD panel and the touch panel:

- The surface can be cleaned with a dry and soft cloth, such as cloths for cleaning glasses.
- If necessary, stubborn stains can be removed by moistening part of a cloth with water to enhance its cleaning power.

## Operator Control Panel

To clean the operator control panel:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe down operator control panel.
3. Use a cotton swab to clean around keys or controls. Use a toothpick to remove solids from between keys and controls.

*NOTE: When cleaning the operator control panel, make sure not to spill or spray any liquid on the controls, into the system cabinet, or in the probe connection receptacle.*

*NOTE: In case of SARS, use bleach, alcohol, or Cidex in a normal diluted form for cleaning/disinfecting the operator panel.*

*NOTE: DO NOT use T-spray or Sani Wipes on the control panel.*

Before cleaning the control panel, make sure the key cap is firmly in place.

## Footswitch

To clean the footswitch:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe the external surfaces of the unit then dry with a soft, clean, cloth.

## Trackball

1. Power off the system.
2. Rotate the retainer counterclockwise until it can be removed from the keyboard.

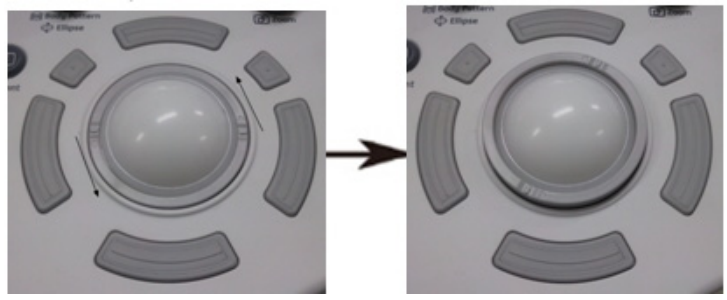


Figure 18-1. Remove the retainer

3. Separate the trackball and the retainer. Wipe off any oil or dust from the trackball, retainer and the trackball housing using a cleaner or cotton swab.
4. Assemble the trackball and retainer, then put it into the housing and rotate it clockwise until its notches are set in the position.

CAUTION

When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

### Probe holder

1. Remove the holder.

Figure 18-2. Remove the holder

2. Wash the holder with mild soap in lukewarm water. Scrub it using a soft sponge, gauze, or cloth to remove all visible residue from the surface. Prolonged soaking or scrubbing with a soft bristle brush (such as a toothbrush) may be necessary if material has dried onto the surface.
3. Rinse the holder with enough water.
4. Dry with a soft cloth and put it back.

### Gel warmer

*NOTE: Gel Warmer is expected to be cleaned when dust or other debris cumulates.*

1. Remove the screw-on lid of the bottom.

Figure 18-3. Gel warmer cap

2. Wipe inside of the gel warmer with soft cloth.
3. Wash the cap with mild soap in lukewarm water. Rinse the cap with enough water.
4. Dry with a soft cloth and put it back.

## Cleaning the air filter

Clean the system's air filters to ensure that a clogged filter does not cause the system to overheat and reduce system performance and reliability. It is recommended the filters be cleaned every two weeks, but the requirements will vary with environment.

CAUTION

Be sure to lock the wheels before cleaning the air filters to avoid injury by any unexpected movement of the system.

DO NOT operate the unit without the air filters in place.

Allow the air filters to dry thoroughly before re-installing them on the unit.

### Cleaning

1. Pull the front cover of cabinet with hand and pull out the air filter.

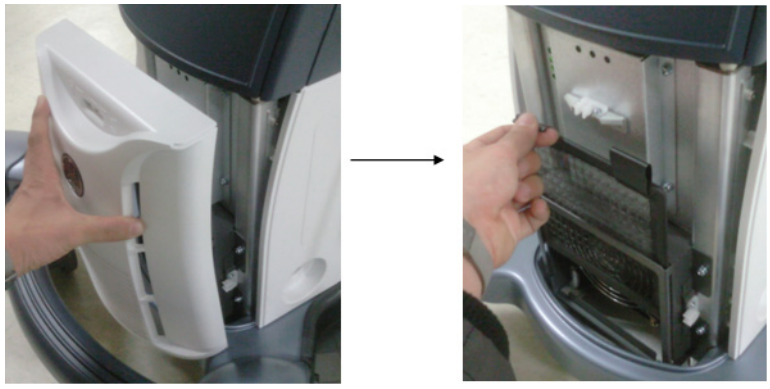


Figure 18-4. Air filter location

2. Dust the filter with a vacuum cleaner and/or wash it with a mild soapy solution.

   If washed, rinse and dry the filter before re-installation.
3. Put back the air filter and the front cover.

## Probe Cleaning

Refer to Chapter 17, the Probes Chapter, for probe cleaning and disinfecting instructions.

CAUTION

NEVER use any cleaner or disinfectant containing alcohol. ONLY use sprays or wipes that are alcohol-free. T Spray II and Septiwipes are alcohol-free.

When cleaning/disinfecting probes using a spray cleaner/ disinfectant, DO NOT spray the probe while the probe is set in its probe holder on the Ultrasound system. Overspray can damage the TGC controls.

Figure 18-5. DO NOT Spray a Probe While in its Holder

## Probe Cleaning (continued)

If you use a spray cleaner, spray AWAY from the Ultrasound system.

Figure 18-6. Spray Probes AWAY from the Ultrasound System

If you are cleaning/disinfecting probes while they are on the Ultrasound system, use a wipe cleaner/disinfectant instead.

Figure 18-7. Using a Wipe to Clean/Disinfect a Probe

## Prevention of static electricity interference

Interference from static electricity can damage electronic components in the system. The following measures help to reduce the likelihood of electrostatic discharge:

- Wipe the alphanumeric keyboard and monitor with lint-free tissue or a soft cloth dampened with anti-static spray on a monthly basis.
- Spray carpets with anti-static spray because constant walking on carpets in or near the scanning room may be a source of static electricity.

## Disposal

Table 18-10: WEEE symbol

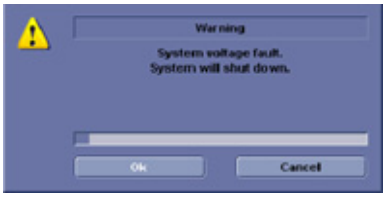
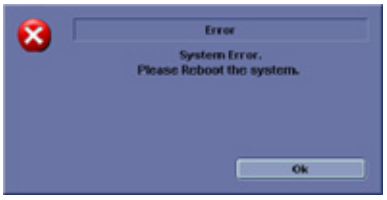
| | |
|---|---|
| | Rear of the system |
| | Probe connector |

Disposal of Old Electrical & Electronic Equipment (applicable in the European Union and other European countries with separate collection systems).This symbol on the product or on its packaging indicates that this product shall not be treated as household waste.Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

## Troubleshooting

Refer to the LOGIQ S7 Expert/Pro Service Manual if other messages appear on the monitor display.

Table 18-11: Error message and workaround

| | |
|---|---|
| | The system has detected the lower air filter requires cleaning.<br>Please clean the lower filter.<br>1. Shutdown the system.<br>2. Clean the air filter according to 'Cleaning the air filter' on *page 18-20*. |
| | System temperature is too high. System will shut down.<br>1. Shutdown the system.<br>2. Clean the air filter according to 'Cleaning the air filter' on *page 18-20*. |
|  | System voltage fault. System will shut down.<br>1. Select ***OK*** and reboot the system.<br>2. If the same message appears after reboot, shut down the system and turn off the breaker. Then turn on the system according to 'Power On' on *page 3-18*. |
|  | System Error. Please reboot the system.<br>1. Select ***OK*** and reboot the system.<br>2. If the same message appears after reboot, shut down the system and turn off the breaker. Then turn on the system according to 'Power On' on *page 3-18*. |

# Quality Assurance

## Introduction

A good Quality Assurance Evaluation program consists of periodic systematic actions that provide the user with adequate confidence that their diagnostic ultrasound system will produce consistently high quality images and quantitative information.

Therefore, it is in the best interests of every ultrasound user to routinely monitor equipment performance.

The frequency of Quality Assurance evaluations should be based on user's specific needs and clinical practice.

Periodic monitoring is essential in order to detect the performance changes that occur through normal aging of system components. Routine equipment evaluations may also reduce the duration of exams, number of repeat exams, and maintenance time required.

For details on system and peripheral routine preventive maintenance instructions, See ‘System Care and Maintenance’ on *page 18-13 for more information.*

## Typical Tests to Perform

Quality assurance measurements provide results relating to system performance. Typically these are:

- Axial Measurement Accuracy
- Lateral Measurement Accuracy
- Axial and Lateral Resolution
- Penetration
- Functional & Contrast Resolution
- Gray Scale Photography.

With these tests, a performance baseline can be set at installation with the phantom in your department. Future test results can be compared to the baseline in order to maintain a record of system performance trends.

### Frequency of tests

Quality assurance tests are used to determine whether a scanner is providing the same level of performance from day to day.

The frequency of testing varies with the amount of system usage and modes to be tested. It is recommended that the user perform quality assurance tests at least every three months or every 400 patient studies. Tests should also be performed when a question about system performance exists.

A mobile system may require more frequent tests.

Image quality should also be tested immediately after the following events:

- Service calls
- System upgrades/modifications
- Dropped probe, power surge, etc.

## Phantoms

Quality Assurance Evaluations may be done with phantoms and test objects that are applicable to the parameters being evaluated or to the user's clinical practice.

Typical phantoms are composed of material that acoustically mimic human tissue. Pins, anechoic and echogenic targets are physically positioned to provide information for a variety of tests.

The RMI 403GS phantom is shown in the illustration below as a representative example of a phantom.

**Phantoms (continued)**

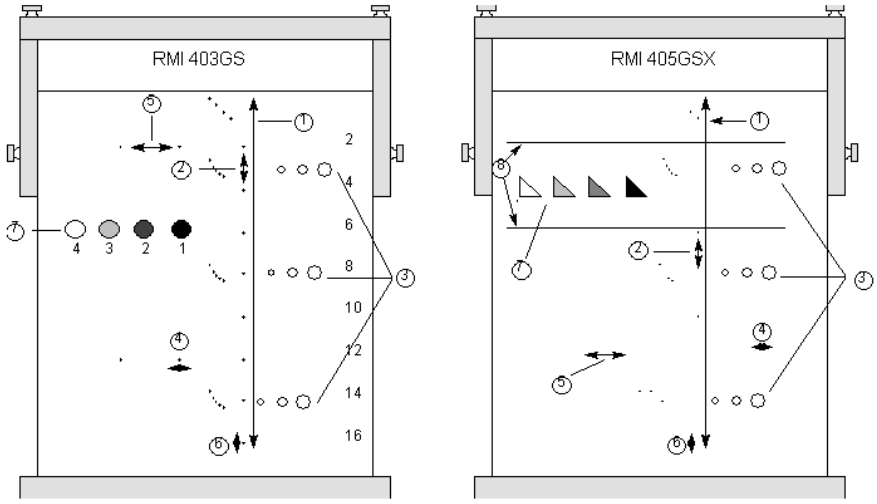



Figure 18-8. Representative Phantom Example

1. Penetration
2. Axial Distance Measurement
3. Functional Resolution
4. Lateral Resolution
5. Lateral Distance Measurement
6. Axial Resolution
7. Contrast Resolution and Gray Scale Photography
8. Gray Scale Plane Targets

## Baselines

An absolute necessity for a quality assurance program is establishing baselines for each test or check. Baselines are established after the system has been verified to be working properly at installation or after a repair. If a probe or major assembly is replaced, new baselines should be generated.

Baselines can be made by adjusting system parameters to prescribed levels or to the best possible image. The key factor to remember is reproducibility. The same conditions must be reproduced for each periodic check.

All system parameters not displayed on the monitor should be recorded for the permanent record.

## Periodic Checks

Periodic checks should be performed in accordance with your facility's quality assurance requirements. For the data to be valid, periodic checks should mimic the baseline setup parameters.

The resulting image, when scanning the phantom exactly as before, should be recorded and compared to the baseline. When a matching image is obtained, it can be assumed that the system performance has not degraded from the baseline.

If a significant difference between the baseline and periodic check is noted, double check the system setup and repeat the test. If the difference between the baseline and periodic check persists, contact a local Service Representative.

Failing to reproduce the control settings as in the baselines will introduce errors in the data and potentially invalidate the results.

## Results

Lack of standardization among test instruments, the wide range of acceptance criteria, and incomplete knowledge regarding the significance of certain performance parameters prohibit the establishment of absolute performance criteria for these tests.

Quality Assurance Evaluation results should be compared to previously-recorded results.

Performance trends can then be detected. Unacceptable performance or diminishing trends should be identified for maintenance or repair before a malfunction or inappropriate diagnosis occurs.

The user should determine the best method for recording and archiving the baseline and periodic checks. In most cases the choice is hard copy.

It is important to maintain good consistent records for inspections that may arise, as well as to detect system performance trends.

## System Setup

The user should tailor the tests to their particular needs. It is certainly not necessary to make all checks with all probes. A representative example, with the probes used most often by the customer, should be adequate in judging system performance trends.

Use a gray scale phantom as the scan object for the tests. Commercial phantoms are supplied with its own operator manual. Be familiar with proper phantom operating procedures prior to use for quality assurance evaluations.

1. Adjust image monitor. Brightness and contrast should be set to the normal viewing of a good gray scale image.
2. Check all recording devices for proper duplication of image monitor. Ensure that what is seen is what is recorded.
3. Annotate non-displayed image processing controls.
4. Set TGC slide pots to center (detent) position.
5. Place focal zone marker(s) in area of interest for an optimum image.

## Test Procedures

The following are recommended Quality Assurance tests. A brief description of the test, the benefit it provides and steps to accomplish the test are supplied.

The importance of recording scan parameters and consistent record keeping cannot be stressed enough. Reproducibility to monitor system trends is the key to quality assurance evaluations.

Using the system's dual image display format is often very convenient and saves recording media.

## Axial distance measurements

### Description

Axial measurements are the distance measurements obtained along the sound beam. See Figure 18-8 for more information.

### Benefit

The accurate measurement of the size, depth and volume of a structure is a critical factor in determining a proper diagnosis. Most imaging systems use depth markers and/or electronic calipers for this purpose.

### Method

Axial distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths or fields of view can be tested.

### Procedure

To measure axial distance:

1. Scan a test phantom with precisely-spaced vertical pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the vertical pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if vertical measurements differ by more than 1.50% of the actual distance.

## Lateral distance measurements

### Description

Lateral measurements are distance measurements obtained perpendicular to the axis of the sound beam. See Figure 18-8 for more information.

### Benefit

The purpose is the same as vertical measurements. Precisely-spaced horizontal pin targets are scanned and results compared to the known distance in the phantom.

### Method

Lateral distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths of fields of view can be tested.

### Procedure

To measure lateral distance:

1. Scan a test phantom with precisely-spaced horizontal pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the horizontal pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if horizontal measurements differ by more than 3mm or 3% of that depth, whichever is greater.

## Axial resolution

### Descprition

Axial resolution is the minimum reflector separation between two closely-spaced objects to produce discrete reflections along the axis of the sound beam. It can also be monitored by checking the vertical size of known pin targets. See Figure 18-8 for more information.

Axial resolution is affected by the transmitting section of the system and the probe.

### Benefit

In clinical imaging, poor axial resolution displays small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

### Procedure

To measure Axial resolution:

1. Scan a test phantom with precisely-spaced vertical pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
3. Press **Freeze** to stop image acquisition.
4. Perform a standard distance measurement of the pin vertical thickness at different points in the image. Record all images for archiving.
5. Scan the vertical pins in zoom or at different depth/scale factors.
6. Press **Freeze** to stop image acquisition; repeat the vertical thickness measurements of the pins and record the images for archiving.
7. Document the measurements for reference and future comparison.

Axial resolution should remain stable over time. Contact a Service Engineer if any changes are observed.

## Lateral resolution

### Description

Lateral resolution is the minimum reflector separation between two closely spaced objects to produce discrete reflections perpendicular to the axis of the sound beam. It can also be monitored by checking the horizontal size of known pin targets. See Figure 18-8 for more information.

Lateral resolution is dependent upon the beam width produced by the probe. The narrower the beam, the better the lateral resolution.

The beam width is affected by the frequency, degree of focusing, and distance of the object from the face of the probe.

### Benefit

Clinically, poor lateral resolution will display small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

### Procedure

To measure lateral resolution:

1. Scan a test phantom with precisely-spaced horizontal pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
3. Press **Freeze** to stop image acquisition and perform a standard distance measurement of the horizontal thickness of a pin at different points in the image. Record all images for archiving.
4. Scan the horizontal pins in zoom or at different depth/scale factors.
5. Press **Freeze** to stop image acquisition; repeat the horizontal thickness measurements of the pins and record the images for archiving.
6. Document the measurements for reference and future comparison.

Pin width should remain relatively constant over time ("1mm). Dramatic changes in pin width may indicate beamforming problems. Contact a Service Engineer if beam width changes consistently over 2 to 3 periodic tests.

## Penetration

### Description

Penetration is the ability of an imaging system to detect and display weak echoes from small objects at large depths. See Figure 18-8 for more information.

Penetration can be affected by the system's:

- Transmitter/receiver
- Degree of probe focusing
- Attenuation of the medium
- Depth and shape of reflecting object
- Electromagnetic interference from local surroundings.

### Benefit

Weak reflecting echoes are commonly produced from the internal structure of organs. Definition of this tissue texture is important in the interpretation of the ultrasound findings.

### Method

Scan a phantom to see how echoes begin to fade as depth is increased. The maximum depth of penetration is the point at which homogeneous material in the phantom begins to lose brightness.

### Procedure

To measure penetration:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom along the vertical pin targets to typical depths for the probe being used.
4. Perform a standard distance measurement from the top of the image displayed to the point at which homogeneous material in the phantom begins to lose brightness.
5. Document the depth measurement for reference and future comparison.

Contact a Service Engineer if the depth of penetration shifts more than one centimeter (1cm) when using the same probe and same system settings.

## Functional resolution

### Description

Functional resolution is an imaging system's ability to detect and display the size, shape, and depth of an anechoic structure, as opposed to a pin target. See Figure 18-8 for more information.

The very best possible image is somewhat less important than reproducibility and stability over time. Routine tests at the same settings should produce the same results.

### Benefit

The data obtained will give a relative indication of the smallest structure the system is capable of resolving at a given depth.

### Procedure

To measure functional resolution:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with a vertical row of anechoic cyst targets to typical depths for the probe being used.
4. Evaluate the cysts at various depths for a good (round) shape, well-defined borders and no fill in. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide optimal cystic clearing.
5. Document all results for future reference and comparison.

Contact a Service Engineer if a greatly distorted image is obtained.

## Contrast resolution

### Description

Contrast resolution is the ability of an imaging system to detect and display the shape and echogenic characteristics of a structure. See Figure 18-8 for more information.

Specific values measured are less important than stability over time. Routine tests at the same settings should produce the same results.

### Benefit

A correct diagnosis is dependent upon an imaging system's ability to differentiate between a cystic or solid structure versus echo patterns from normal surrounding tissue.

### Method

A phantom with echogenic targets of different sizes and depths should be used.

### Procedure

To measure contrast resolution:

1. Set the front panel TGC slide pots to their center (detent) position. Set dynamic range to 54 db.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with echogenic targets at the depths available.
4. Evaluate the echogenic targets for contrast between each other and between the surrounding phantom material. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide an optimal scan image.
5. Document all results for future reference and comparison.

Contact a Service Engineer if the echogenic characteristics or shapes of the targets appear distorted.

## Gray Scale photography

### Description

Poor photography will cause loss of low level echoes and the lack of contrast between large amplitude echoes. See Figure 18-8 for more information.

### Benefit

When photographic controls and film processors are properly adjusted, weak echoes, as well as strong echoes, are accurately recorded on film.

### Procedure

1. Adjust the camera according to the manufacturer's instructions until the hard copy and video display are equal.
2. Scan the phantom and it's echogenic contrast targets.
3. Make a hard copy photograph of the display and compare it to the image on the video monitor for contrast and weak echo display.
4. Document all results for future reference and comparison.

Contact a Service Engineer if camera cannot duplicate what is on the image monitor.

*NOTE: Optimization of brightness/contrast controls on the display monitor is imperative in order to make sure that the hardcopy and monitor look alike.*

The display monitor is adjusted first. The hardcopy camera or printer is adjusted to match the display monitor.

## Setting up a Record Keeping System

### Preparation

The following is needed:

- Quality Assurance binder.
- Hard copy or electronic file of images.
- Quality Assurance Checklists.
- Display the following information while testing quality assurance:
  - Acoustic Output
  - Gain
  - Depth
  - Probe
  - Dynamic Range
  - Set up new patient to be the name of the test.
- Annotate the following:
  - Any control where its value is **NOT** displayed.
  - Significant phantom information.

### Record Keeping

Complete the following:

1. Fill out the Ultrasound Quality Assurance Checklist for each probe, as scheduled.
2. Make a hard copy or archive the image.
3. Compare images to baseline images and acceptable values.
4. Evaluate trends over previous test periods.
5. File hard copy or electronic file of images and checklist in Quality Assurance binder.

## Ultrasound Quality Assurance Checklist

Table 18-12: Ultrasound Quality Assurance Checklist (Part 1)

| | | |
|---|---|---|
| Performed By | | Date |
| System | | Serial Number |
| Probe Type | Probe Model | Serial Number |
| Phantom Model | Serial Number | Room Temperature |
| Acoustic Output | Gain | Focal Zone |
| Gray Map | TGC | Depth |
| Monitor Setting | | |
| Peripheral Settings | | |
| Other Image Processing Control Settings | | |

Table 18-13: (Part 2)

| **Test** | Baseline Value Range | Tested Value | Image Hardcopy/Archived | Acceptable? Yes/No | Service Called (Date) | Date Resolved |
|---|---|---|---|---|---|---|
| Vertical Measurement Accuracy | | | | | | |
| Horizontal Measurement Accuracy | | | | | | |
| Axial Resolution | | | | | | |
| Lateral Resolution | | | | | | |
| Penetration | | | | | | |
| Functional Resolution | | | | | | |
| Contrast Resolution | | | | | | |
| Gray Scale Photography | | | | | | |

# Assistance

## Supplies/Accessories

CAUTION

**DO NOT** connect any probes or accessories without approval by GE.

CAUTION

Use only GE Healthcare approved internal equipment when replacing an internal peripheral.

The user or the operator should never install/replace the internal peripheral. Service representatives authorized by GEHC will install/replace the internal peripheral.

Not all features or products described in this document may be available or cleared for sale in all markets.

Contact the distributor, GE affiliate or sales representative for approved peripherals. For HCATs, contact your sales person. For 2million/5million number part numbers, these are service replacement part numbers that may be either new or refurbished. To order these, contact CARES in the US, or call service in Europe and Asia.

The following supplies/accessories have been verified to be compatible with the system:

## Peripherals

Table 18-14: Peripherals and Accessories

| Accessory |
|---|
| Sony B/W Printer Model UP-D897 |
| Sony Color Printer Model UP-D55 |
| Sony Color Printer Model UP-D25MD |
| DVR |

## ECG Accessories

Table 18-15: ECG Accessories

| Accessory |
|---|
| ECG module |
| ECG Cables AHA Style |
| ECG Cables IEC Style - Short |

## Console

Table 18-16: Console Accessories

| Accessory |
|---|
| Footswitch |
| Endocavity Probe Holder |
| Optional Probe Holder |
| Side Tray |
| Low cabinet |
| Mid cabinet |
| High cabinet |
| Side cabinet |
| Greek Keyboard |
| Russian Keyboard |
| Norwegian/Danish Keyboard |
| Swedish Keyboard |
| Power Cord - US |
| Power Cord - Argentina |
| Power Cord - Italy |
| Power Cord - UK-Ireland |
| Power Cord - Switzerland |
| Power Cord - Denmark |
| Power Cord - Israel |
| Power Cord - Japan |
| Power Cord - China |
| Power Cord - Australia |
| Power Cord - India |
| Power Cord - South Africa |
| Power Cord - Brazil |

## Probes

Table 18-17: Probes and Accessories

| Probe | Biopsy Guide |
|---|---|
| 3CRF-D<br>Micro Convex | Single Angle, Disposable with a Reusable Bracket<br>Multiline Starter Kit<br>Multi Biopsy<br>Multi Spare Screw<br>Multi 13, 14, 15G<br>Multi 16, 17, 18, 19G<br>Multi 20, 21, 22, 23G |
| C1-5-D<br>Convex | Multi Angle, Disposable with a Reusable Bracket |
| IC5-9-D<br>Micro Convex Intracavitary | Single Angle<br>Disposable with a Plastic Bracket or<br>Reusable with a Stainless Steel Bracket |
| S4-10-D Sector | Not Available |
| L8-18i-D | Not Available |
| 9L-D<br>Linear | Multi Angle, Disposable with a Reusable Bracket |
| P2D<br>CW Split Crystal Pencil Probe | Not Available |
| P6D<br>CW Split Crystal Pencil Probe | Not Available |
| 11L-D | Multi Angle, Disposable with a Reusable Bracket |
| ML6-15 | Multi Angle, Disposable with a Reusable Bracket |
| 3Sp-D | Multi Angle, Disposable with a Reusable Bracket |
| RAB4-8-D | Single Angle, Disposable with a Reusable Bracket, Single angle reusable |
| 8C | Not Available |

## Options

Table 18-18: Options

| Accessory |
|---|
| LOGIQView |
| Contrast Enhanced Ultrasound (Not available in the USA)* |
| Scan Assistant |
| DICOM 3.0 connectivity |
| Report Writer |
| Real time 4D |
| 4D with VCI |
| VOCAL II (Volume Calculation) |
| Tomographic Ultrasound Imaging |
| Continuous Wave (CW) |
| Tissue Velocity Imaging (TVI) |
| Elastography |
| Elastography Quantification (Not available in the USA) |
| Advanced 3D |
| B-Flow |
| Auto IMT |
| Flow Quantification |
| Stress Echo |
| B Steer+ |
| ECG |
| DVR |
| Footswitch |
| *The LOGIQ S7 Expert/Pro is designed for compatibility with commercially available Ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast-related product features are enabled only on systems for delivery to an authorized country or region of use. |

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